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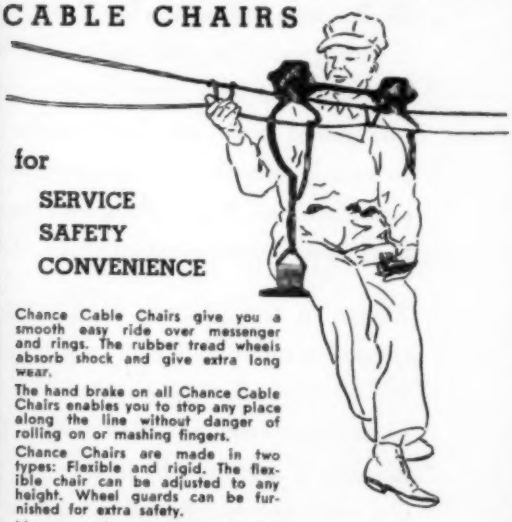

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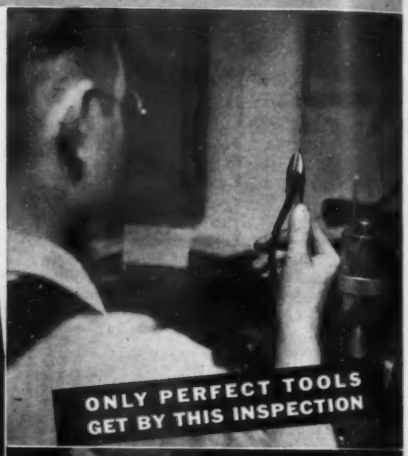

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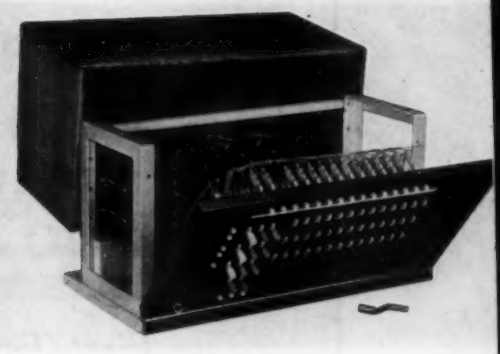
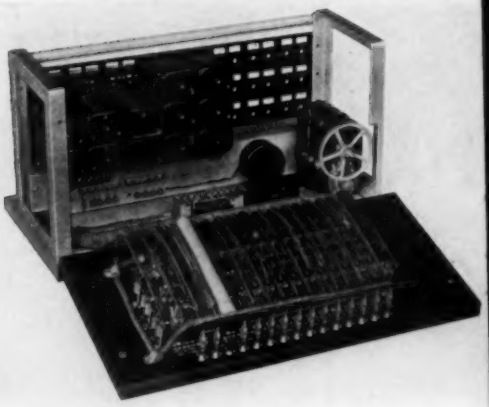
MONEY *in* OPERATION





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Telephony

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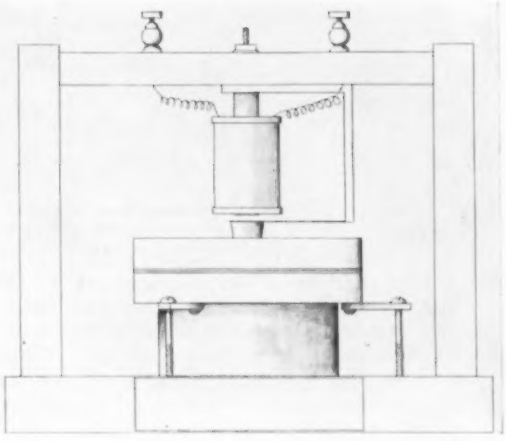
Telephony

AUGUST 28, 1937 VOLUME 113, NUMBER 9

FASHIONS AND TELEPHONES

By MISS NELLE ROBERTS

PICTURE STUDY of traffic side of telephone business shows paralleling of fashions in women's dress and designs of telephone instruments from time of invention of telephone down to present day. Streamlined telephone and streamline-dressed operator of present day have eliminated excess baggage of their predecessors, with efficiency in every line. Fig. 1, at the right, pictures the first telephone invented by Alexander Graham Bell in 1875. Address given before annual traffic conference of Iowa Independent Telephone Association



MANY PEOPLE think of art as a perquisite of wealth, a hobby of leisure or as a mere trimming on the good, necessary homespun of life. Therefore, according to their temperament, they ignore it or despise it. They, too, have divorced art from life, segregating themselves in a little garden of their own, walled about from the world, cultivating their several patches of flowers.

In the study of art, however, one of the first fundamentals is to find out what the artist intended to convey by the picture he has painted. It will be necessary to know the time when it was painted, the history of the time in which it was painted, and to have a general understanding of the life of the time. So, in this study of the "Traffic Side" of the telephone business, I shall give you some studies of pictures, compare them with the times in which they were made, and tell you what I have been able to find in them. These sketches.

Fig. 3. From Left to Right These Ladies Are, Respectively, Miss 1856, Miss 1866 and Miss 1876. The Excess Baggage of Their Costumes Is Reflected in the Design of the Early Telephone Instruments.

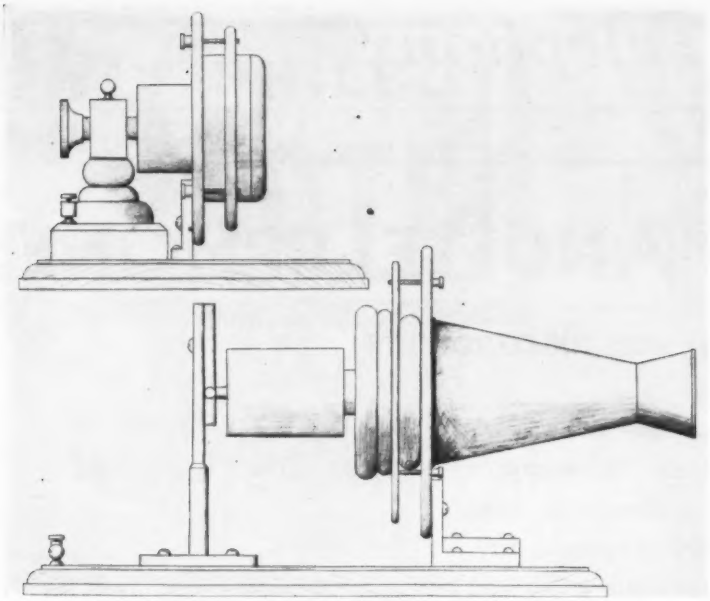


Fig. 2. The First Transmitter Exhibited at the Philadelphia Centennial, in 1876, Attracted But Little Attention Until It Was Noticed by Dom Pedro, Emperor of Brazil. "My God. It talks!" Was His Startled Comment.

I hope, will show the similarity of the telephone with the times, and how it has developed with the trend of the times.

John Mills in his book, "The Magic of Communication," describes the telephone as "a marvelous device which catches a spoken word, turns it like magic into something we cannot see or hear; speeds it along the wires to another telephone—and there the magic is undone and the hidden word comes forth."

"The transmitter," says Mr. Mills, "casts a spell upon each word it catches, sending it noiselessly away along the wires. The receiver breaks the spell and a living word, bearing its message from a distant speaker issues forth."

I suspect in modern terms we might say, "The words go in here, the words go 'round and 'round and come out here."

Alexander Graham Bell, in 1875, created the first telephone (Fig. 1), and it was able to speak the magic word. There was neither magic nor magician, however, at the other end of the wire to catch the spoken word and transmit it back to Bell. So Thomas A. Watson, Mr. Bell's assistant, had to drop his part of the work and run to Mr. Bell to tell him that his call for help had been heard. And in the excitement the purpose of Bell's call for aid in washing battery acid from his trousers was forgotten.

This is the telephone that spoke that first sentence clearly; and that emergency sentence was: "Mr. Watson, come here; I want you."

One year after the first telephone was invented, Mr. Bell exhibited the first transmitter (Fig. 2) at the Philadelphia Centennial Exhibition, in June, 1876. A friend of Mr. Bell's, Dom Pedro, the emperor of Brazil, South America, saw the exhibit, talked over it and exclaimed "My God! It talks."

This peculiar instrument, crude and cumbersome, caught the first spoken word, turned it like magic into something which could neither be seen nor heard, sped it along a wire to the receiver—and there the magic was undone and the hidden word came forth.

Fig. 4. The Wall Telephone of 1878 Indicates Progress Over the First Telephones.

At that time there was no telephone traffic to speak of; but in a few short years, telephone traffic became a problem.

Can you see in this picture the thought the artist wished to convey? Can you see in this picture an instrument of service—homes linked with offices; physicians put in touch with patients; isolation of farmers swept aside; cities bound together with the bonds of speech?

While there was no traffic problem of that day, what if there had been some great need?

Fig. 5. The Telephone Operator of 1878, Soon Replaced by Girl Operators Who Were More Courteous and Usually Settled Their Arguments by Long Distance.

I wish to show you how the styles of the day were in perfect keeping with the times.

View, if you please, another sketch. Can you imagine these ladies (Fig. 3) carrying on any great amount of business or answering the traffic problem?

Note, also, the design or style of the telephones of 1875 and 1876. The inventor probably had no thought of keeping up with the styles when he manufactured this equipment; neither did "Vogue" have in mind anything but the lady's wardrobe when designing these costumes, but note the excess baggage on each. The background of these ladies would lead us to believe they had no part in the business of the day.

Note the progress to the wall telephones of 1878 (Fig. 4), two years after the invention of the telephone. Traffic problems did bother some, the users of the telephone of that date. A number of exchanges had been established in different cities. Detroit, Mich., and Chicago, Ill., had telephones in limited numbers.

In 1878, an innocent-looking youngster (Fig. 5) became the link between the telephone users—the

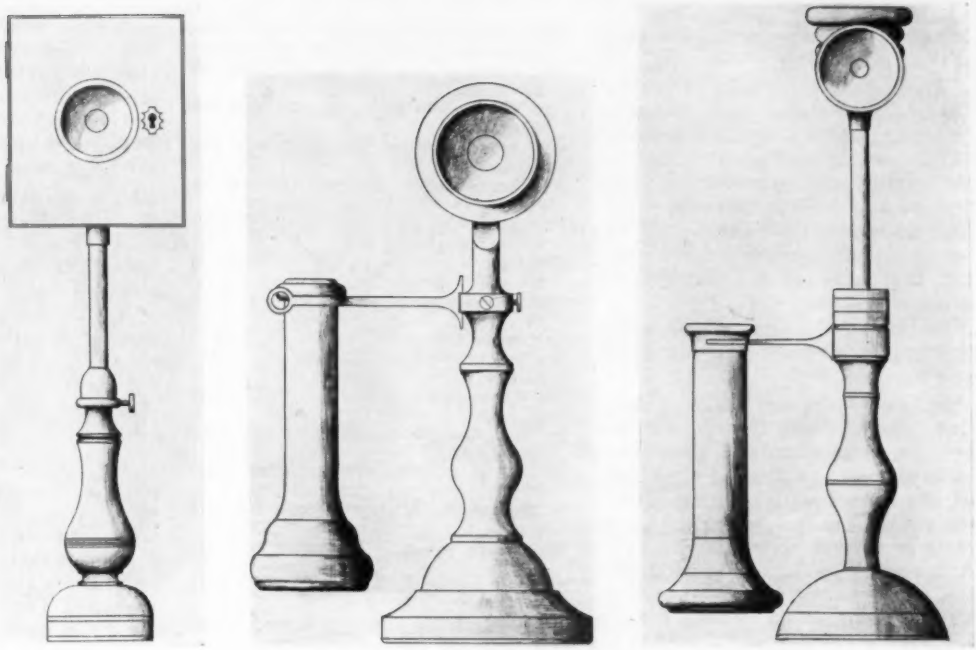


Fig. 6. From Left to Right These Are, Respectively, the Telephones of 1879, 1896 and 1899. Although Representing Improvements in the Mechanism, These Instruments Do Not Present Radical Changes in Appearance Over Earlier Designs.

telephone operator. He may look innocent enough; but, no doubt, he is hiding something—in his hands—behind him.

Switchboards had put in an appearance; they, too, were large and cumbersome. They were so large the operators were compelled to grab a plug when a call came in for another number, and rush to the other end of the board at which the "called number" was located, in order to complete the connection.

Tradition tells us that many times two operators would meet in transit and, as neither wanted to give way to the other, a real knockdown fight would ensue. And if a subscriber became too insistent in his wants—or would in any wise offend one of these little ones—he was invited to meet the boy operator "right down his alley." Traffic might have to be delayed until the argument or the principle was settled, but that did not matter.

It was not long, then, until girls succeeded the boys as operators—the reason being obvious. Girls were more courteous and usually their arguments were settled by "long distance." Oh, yes, they had arguments, and many of them, of which I shall speak later.

While improvements in the mechanism were continually being made, the telephone instrument itself did not change in appearance (Fig. 6). However, look at the lady—the operator of the day in 1899 (Fig 7). She does not resemble the operator of today.

It was not until about 1890, when telephone operators, and owners of telephone systems began to realize that much time and energy were being taken up needlessly by arguments, and that the well-modulated voice could be transmitted over the wires much more easily than the harsh, rasping voices of two operators who had decided to fight it out, verbally.

Traffic was picking up; time on the lines began to mean money; and a new business sprang up—that of educating the operator so that she would be more than a stormy belligerent over the wires. Rules were established with laws governing traffic. Operators then began to realize that their work was more than just the capacity to fill a chair at the switchboard and yell, "Hello."

Slowly, very slowly did work progress in the traffic department—down through another decade. Operators did not give much time to voice technique. In 1892, it was possible for the voice to travel overhead 900 miles—from New York to Chicago. Yet, there was not a great amount of long distance operating, and operators had not had much practice in

Fig. 7 to the Left Shows Miss Telephone Operator of 1899. Fig. 7 to the Right Shows Miss Operator of 1917 Who, Having Stepped Out of the Cumbersome Styles of Her Predecessors, Was Developing Speed Along With Many Other Operating Requisites.

learning how to meet another operator on long distance lines.

Another decade passes, and we find the telephone traffic slowly but surely pushing its way into big business. I was unable to find a picture of the seven-pound transmitter which the operator wore in those days. Perhaps it was a good excuse for her to chafe under such a burden, wearing that kind of a headpiece for hours at a time.

In the rural communities about this time, a telephone was something of a novelty.

Sales of telephones began at about this time, but still the operator did not have much to do with the department of sales. All she had to do then, was to learn laws governing operating-voice technique, which had begun to be a feature stressed. By 1915, it had developed to such a point that the telephone companies adopted as their slogan "The Voice with a Smile."

The operator (Fig. 8) had stepped out of the old cumbersome styles, and had started to develop speed along with the many other requisites. The telephone, too, had dropped some of its square corners and knobby architecture.

While she had become efficient in handling her work, the operator had been accused of being practically the medium through which the conversations were carried on, and of listening to all conversation that went over the lines. This tribute was paid to The Telephone Girl of 1906-1912 by an unknown author:

The telephone girl still sits in her chair,
and listens to voices from everywhere.
She hears all the gossip, and hears all the news,
She knows who is happy and who has the blues;
She knows all of our sorrows, she knows all of our joys,
She knows every girl who is chasing the boys;
She knows all our trouble, she knows all our strife;
She knows every man who is mean to his wife;
She knows every time we are out with the boys;
She hears the excuses each employs.
She knows every woman who has a dark past;
She knows every man who's inclined to be fast;
In fact, there's a secret 'neath each saucy curl,
Of that quiet, demure-looking telephone girl.
If the telephone girl told all that she knows,
She'd turn many friends into bitterest foes,
She'd sow a small wind that'd soon be a gale,
She'd engulf some in trouble and others in jail.
She'd let go a story that gaining in force,
Would cause half the wives to sue for divorce.
She'd get all the churches mixed up in a fight,
And turn many days into sorrowing nights.
In fact, she would keep the whole town in a stew
If she told but a tenth of the things that she knew.
Say, reader, doesn't it make your head whirl
When you think what you owe to the telephone girl?

During the next decade, it seemed that we had reached the pinnacle of perfection (Fig. 9). Look at that telephone, and look at that operator! Just what has the artist sketched in that picture; what has the manufacturer developed in that instrument? What would they have us learn from viewing this painting?

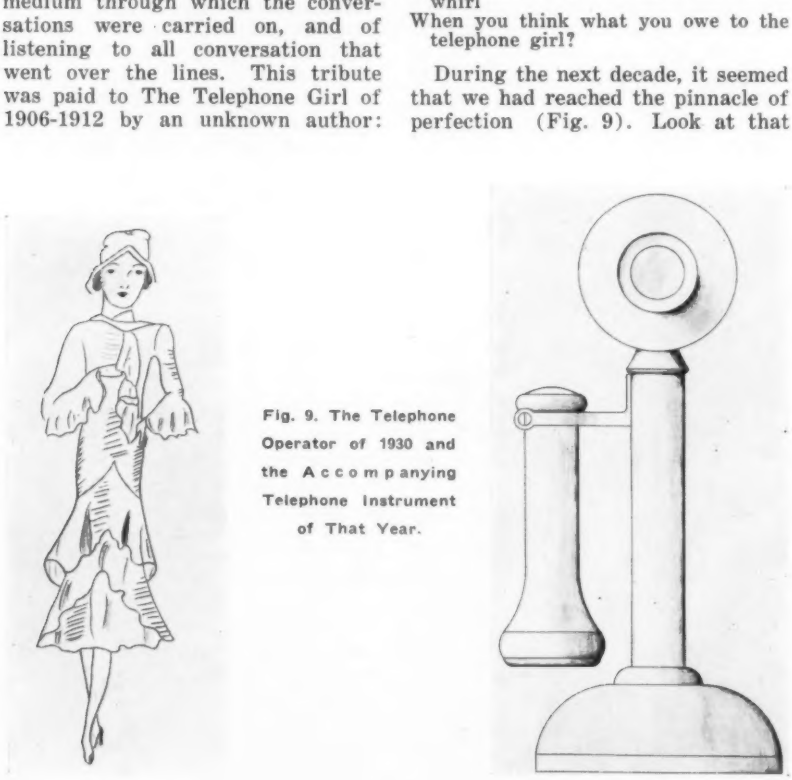


Fig. 9. The Telephone Operator of 1930 and the Accompanying Telephone Instrument of That Year.

For one thing, the operators were taking intensive training along the line of efficiency through actual work: The putting up of switchboard plugs; the cutting down of time spent on the lines; the consolidation of work; the cooperation of tributary with toll center; the coordination of work and the converging of toll traffic at the toll center, where the work was done by a trained expert—the toll center operator.

In other words, we were developing efficiency experts along the lines of operating, and everyone was learning to operate more efficiently. Telephone companies had begun to check to find the time that was spent by operators from everywhere worrying their messages through, and a very strict set of rules and laws for traffic was issued.

Experts were sent throughout the states to assist in that development, and from 1915 to 1925 was an intensive time of scraping the barnacles of inefficiency from telephone practices and cleaning house in order to develop traffic.

I would like to add a personal note to these decades from 1915 to 1935. To say that I am happy to have taken part in this extensive study and development, would be putting it mildly. To see the old methods fade into the past was a grand and glorious feeling.

Many times, in passing the telephone office, I have been arrested by a clarion call from the telephone operator endeavoring to get a message through, and at that time I did not know but that it was necessary to fight one's way through. How I have enjoyed the development of telephone traffic from 1915 to the present time!

Came the 1926 period, when instructions were tightening up—strait-laced 'n everything. A set of rules and regulations was written for us—an answer to every question. In other words, to become efficient, we took correspondence courses, both local and toll. Operators were instructed in the upright method, and, looking at the telephone (Fig. 9) they dressed in the same style.

Can't you see these phrases just had to come along to keep pace with the style of architecture and garments? Styles were short, pert and right up to the minute. There was

a phrase for every occasion; this was in order that our work would slip right along in the smoothest possible manner, with the speediest kind of service. Every effort was put forth to permit everybody to talk and talk. Salesmanship came into the picture in a small way.

In 1929, "Old Man Depression" hit us. We were stunned by the trend of the times and customers were lost by the thousands. What were we to do? We had practically reached the saturation point, where every business and every farm had a telephone.

How to recover was our next problem. Everything that would add efficiency to our service was considered. It was now necessary to get into the sales game. We attracted customers not only by efficient service, but with a more modern instrument.

We dressed our operators in the latest styles. We learned the sales game in every detail. We took intensive studies in the methods of selling telephones. We followed the trend of transportation and went streamlined. We now have streamlined telephones and the streamline-dressed operator, Fig. 10.

Can't you see efficiency in every curve? Not a line will divert the eye from the purpose of her business. Not a line can be changed on our telephone to make it do its part and look the part of our telephone business.

To make our work better and bigger has been the trend of our thought all down through the years. May I now ask what shall we have as our next picture? What will it mean to you and to me? What can you read in the next decade? Will it symbolize that incentive which will keep operators at their jobs until they have solved the traffic problems of the future?

In what manner can the telephone work be made more efficient? What of the next picture? Will you help paint that picture in order that it may keep pace with the trend of the times?

Some one has figured that one man of today can do the work of 17 men 20 years ago. What of the future?

My plea to you is to have a part in the painting of that next picture —to make it the best in telephone history. And when that is accomplished, what a thrill will come to you when you will be able to say: "I had a paint brush in my hand and helped to add strokes to that picture." Although it may be only a few strokes in the background, it will add to the next picture of progress in the art of telephony.

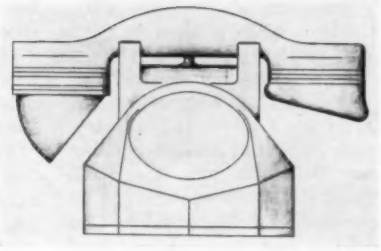


Fig. 10. The Streamlined Telephone of 1937 and the Streamline-Dressed Operator of Today, With Efficiency in Every Curve.

ALTHOUGH RETIRED FROM TELEPHONE FIELD MISS NELLE ROBERTS FINDS OPPORTUNITY FOR SERVICE

MISS NELLE ROBERTS, who retired last spring from active service in the telephone field after more than 23 years of continuous service with the Iowa Continental Telephone Co., Rockwell City, Iowa, and its predecessors, has been one of the most conspicuous figures among the women in Independent telephone circles.

Although in recent years serving as assistant secretary and cashier, she previously served the Rockwell City company in other capacities, including those of clerk, operator, chief operator, bookkeeper and acting manager.

For the past 15 years or more Miss Roberts has participated in a unique way in state and district convention programs of the Iowa Independent Telephone Association and, through the columns of TELEPHONY, has inspired and assisted traffic employes in all parts of the country.

Miss Roberts' chief activity in association work has consisted in dramatizing instructions in local and toll operating practices, directing the attention of operators in a very effective and amusing fashion, to some of the errors of their ways, or of their predecessors, and demonstrating the efficiency of improved operating practices. Her skits have been presented at operator conferences in many states.

Over a period of years several of the district conferences of the Iowa Independent Telephone Association

have been held in Rockwell City, with Miss Roberts presiding and directing the meetings. At one time she took the place of Miss Anne Barnes and assumed charge of the state operators' conference in Des Moines. In 1928 Miss Roberts declined the position of traveling chief operator for the Illinois Telephone Association, choosing to remain with the Rockwell City company.

Since her retirement from active telephone work, Miss Roberts is spending part of her time in a newly-organized activity in instruction in telephone operating. She yielded to persuasion when Miss Johnston, superintendent of the Iowa State Wom-

en's Reformatory at Rockwell City, asked her to conduct a class in PBX operating for such women in the institution as might be interested.

This is believed to be the first experiment of its kind in the country, and already it gives promise of being a success. With the aid of a PBX switchboard and telephones loaned by the Fort Dodge Telephone Co. and some supplies and textbooks secured from the Northwestern Bell Telephone Co. at Des Moines, Miss Roberts has for some months been giving instructions in telephone operating three times a week to a class of five girls, one of whom is a negress. One member of the class, a Spanish girl, left the home about July 11, with the expectation of securing employment in her home state of Mississippi, operating a hotel PBX.

To supplement her instructions at the reformatory, Miss Roberts has taken members of her class, one by one, into the telephone operating room at Rockwell City to witness the operation of a larger communication system. She states that she has made use of study courses on local and toll operating by Miss Anne Barnes, which were published some years ago by the United States Independent Telephone Association, courses which she herself studied and completed.

The atmosphere about the reformatory at Rockwell City, says Miss Roberts, is quite different from that described by Christopher Rollman in an article entitled, "Keep Your Convicts," published in the Readers' Digest for July. The superintendent, she says, does everything in her power to reform the members of her family, numbering from 130 to 140, and to send them out with the ability to earn their living.

In addition to participating in the work of running a farm and dairy, the women are taught home economics, including cooking, canning, sewing and laundry work. Classes are also offered in commercial work, with instruction in shorthand, typing and many other studies.

"I trust that when these girls are released from the reformatory there will be a place for them in the industrial world," says Miss Roberts, in commenting upon her new venture, "as they are certainly learning to work."

And thus the spirit of service gained by Miss Roberts in her years of affiliation with the telephone industry lives on and continues to grow as "Time Marches On."

GOSSIP—THE CAT'S SCRATCH

By Gladys Casner

"Have you ever heard of Gossip Town,
On the shores of Falsehood Bay,
Where Old Dame Rumor with rustling gown
Is going the livelong day?"

There is no such thing as harmless gossip—among an operating force or elsewhere. Either it is malicious or it does not exist. When Mary Jones whispers to Ruth Smith that she saw Mrs. Roberts' husband with another woman and she positively wouldn't mention it, but she feels so sorry for poor Mrs. Roberts, she means that she is telling all this for the sheer, luscious feeling of creating a little excitement and perhaps unhappiness in a home.

You really don't repeat stories to people or about people for their own good; you do it for their harm. Your fellow operator's private life should not be of such interest to you that you enjoy repeating stories of shadows that hang over it. Furthermore, if one is really well bred and does not ask too personal questions, there is small chance of knowing the colors of the skeleton in any one's closet. Repeating harmful gossip is more of a reflection upon you than the person you are talking about.

Let's not carry personalities into an operating room! I have known of operators who actually resented correction from a supervisor because they believed that morally they were above their superior. This may be true, but if it were not for gossip, this fact would not be known and its hindrance felt.

Malicious gossip has wrecked more homes and business careers, created more discontent, ruined more reputations, caused more jealousy and envy, and blasted more friendships than any other single factor in existence. Charles Claypool, a Seattle justice of the peace, recently issued this statement, "More divorces and more unhappy homes are caused by women who talk too much than by any other thing."

If you doubt the truth of this theory, recall all the "scandals" that have occurred in any office, telephone or otherwise, in which you have worked. Just to be perfectly frank, wasn't the one who was supposed to have "sinned," just a little stronger character than the one who started the story of the "sinning"?

Each repetition of the story naturally contains some part of the speaker's personality—a little added dirt. How much of this revelation of the gossiper comes from an exchange of confidences of supposed-to-be friends? A person who would reveal a secret, told her in good faith, should not question the morality of another.

When you are tempted to listen to a story about any one in your office, remember this: No happening was ever repeated exactly as it occurred. If it were, the juries of the United States courts would not have so much trouble reaching their decisions. Small offices are more likely to be victims of gossip; in fact, "you never know how small a small office can be until you hear its gossip."

Curiosity is a tool of progress if used constructively; it is a tool of horror if used destructively. Curiosity breeds the desire to listen to gossip, and the desire to satisfy the curiosity of someone else may be a small motive for passing the story on.

But as "curiosity killed a cat," one may well be careful; under these conditions, one might well be compared with a cat of the very feline nature. Gossip is a cat's scratch on the heart of an unsuspecting person.

New York Telephone Co. Is Safety Winner

Only two personal injury and 17 property damage accidents resulted in June among 735 motor vehicles participating in the inter-fleet safe driving contest sponsored by the New York Chamber of Commerce safety division.

Winner of The Herald-Tribune trophy for safe driving in June was the New York Telephone Co. Thirty-seven firms competed, operating vehicles over a total distance of 951,127 miles.

Group winners were the New York Telephone Co., Central City Cold Storage Company, Bartels Brewing Company, Netherland Company, Jewel Tea Company, Easy Washing Machine Corporation and Richards Sign Company.

Mountain States T. & T. Valuation in New Mexico

The Mountain States Telephone & Telegraph Co.'s valuation has been raised $1,242,380 for New Mexico, to a total of $3,005,771, by the New Mexico Tax Commission, continuing the assessment of corporate properties, except railroads, on the basis of the state-wide physical appraisal made by engineers in the commission's employ.

The telephone company's increase is one of the largest announced so far.

Mathematics For Telephone Engineers

By H. H. HARRISON

ARTICLE EIGHT, SECTION II, of this mathematics series—written to aid telephone engineers in handling alternating current problems—continues the discussion of vectors begun in the issue of July 24. This series started in TELEPHONY of May 30, 1936

SPECIAL CASES OF MULTIPLICATION AND DIVISION: The product $a\angle\Theta \times b\angle\phi$ is, in general, complex. If the angles Θ and ϕ are equal and opposite, $a \times b$ is real and lies along the x axis. See Fig. 129 (a). This also holds if the difference in the angles is $180° - \Theta$. If the angles are ϕ and $90° - \phi$, $a \times b$ is imaginary or lies on the j axis (Fig. 129 (b).)

The quotient $(a\angle\phi)/b\angle\Theta$ is real if $\Theta = \phi$, Fig. 130 (a), and imaginary if the angles are ϕ and $(90° + \phi)$, Fig. 130 (b). If $a^n = a^n\angle n\phi$, this is real if $n\phi = +180°$ or $0°$ and imaginary if $n\phi = \pm 90°$.

$$(a\angle\phi)^{1/n} = a^{1/n}\angle\phi/n$$

This is real if $\phi/n = +180°$ or $0°$ and imaginary if $\phi/n = \pm 90°$.

CONJUGATE VECTORS: If a vector is represented by $a = a_1 + ja_2$, its conjugate is $a^x = a_1 - ja_2$; and the angle ϕ, whose tangent is a_2/a_1, is positive for the first and negative for the second or conjugate vector (Fig. 133). The sum of the two vectors is $a + a^x = a_1 + ja_2 + a_1 - ja_2 = 2a_1$. The difference $a - a^x$ is, obviously, $2ja_2$.

The product $a.a^x = (a\angle\phi \times (a^x\angle -\phi = a^2$ and is real.

The quotient $a/a^x = (a\angle\phi/(a^x\angle -\phi) = 1\angle 2\phi$, a vector of absolute value 1 and doubled angle with respect to the positive, real, axis.

In experimenting with vectors on the drawing board, a procedure to be heartily recommended, it is frequently necessary to divide a line the total length of which is not an exact multiple of the unit adopted for the scale on which the vectors are based. The proportional scale of Fig. 131 will be found very useful. The horizontal lines, which may be increased in number to any desired extent, correspond to eight different scales, and the vertical lines divide each of these into ten equal parts. This subdivision may, of course, be extended.

Another useful "dodge" is the graphic method of dividing a line a by another line b. The diagram (Fig. 132) explains itself.

VECTORS WHICH ARE SINE FUNCTIONS OF TIME: Assume Oa, Fig. 134 (a), rotates through $360° = 2\pi$ radians in T seconds, its angular velocity $ST = 2\pi/T$ revolutions per second. If the time is counted from the instant when Oa moves from the horizontal position of the diagram, then an angle such as $\Theta = 2\pi t/T$, where t is some fraction of the *periodic* time T and is the time which has elapsed while Oa was describing the angle Θ.

Fig. 134 (b) is a plot on a time base of the value of $\sin 2\pi t/T$ from $t = O$ to $t = T$. If the cycle is repeated many

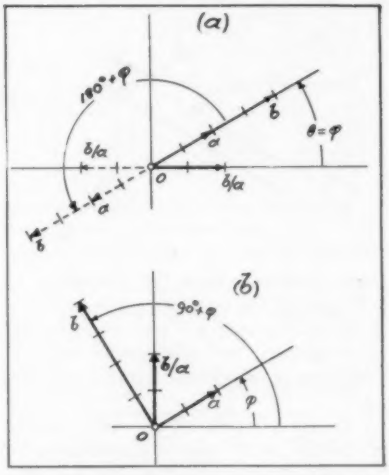


Fig. 130. Special Cases Where $|Z_1|/|Z_2|$ Is (a) Real, (b) Imaginary.

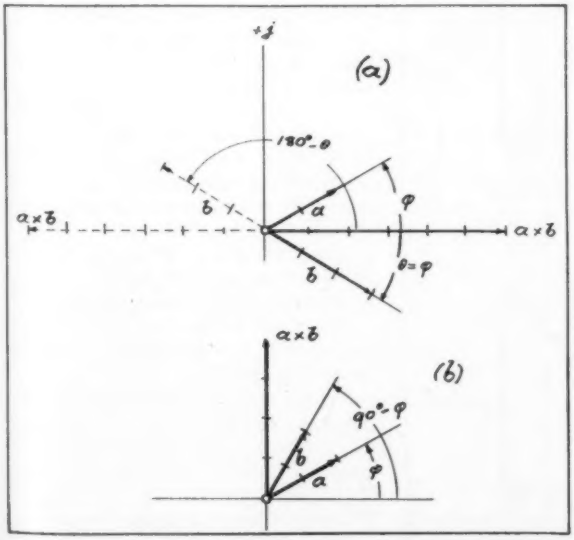


Fig. 129. Special Cases Where $|Z_1| \times |Z_2|$ Is (a) Real, (b) Imaginary.

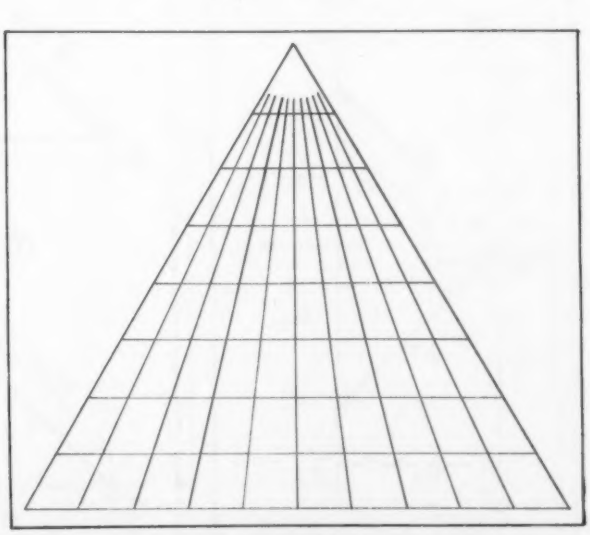


Fig. 131. Proportional Scale for Subdividing Vectors Not an Exact Multiple of the Unit Adopted for the Scale.

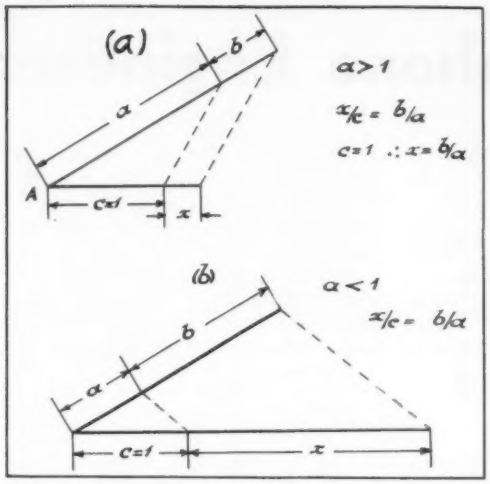


Fig. 132 (Left) Graphic Method of Dividing Two Lines a and b.

times a second, then the frequency is 1/T; and if i is an alternating current, it is represented at any moment by $i = I \sin 2\pi ft$. $2\pi f$ is variously written p or w and, using the latter, $i = I \sin wt$.

i is the instantaneous value of the current at time t and is ascertained, in the case of the circle diagram, by projecting the rotating vector on the vertical axis and producing an oscillating vector there, varying between ± 1. $\pm$ I is, therefore, the maximum value of the current and is reached when $\theta = wt = wT/4$ or $3T/4$. At $t = O$, $wt = O$ and $i = O$.

(a) Let $i = I \sin wt$.

The e.m.f required to maintain a current, i, in a pure resistance, R, is equal at every instant to Ri. Therefore, $e = Ri \sin wt$. The e.m.f. and the current are in phase with one another; that is to say, there is no angle between the vectors representing the two quantities, and the maximum value of e is

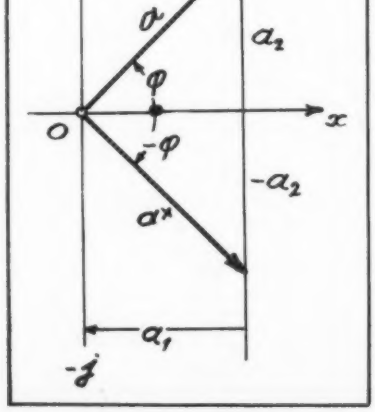


Fig. 133. Illustrating Conjugate Vectors.

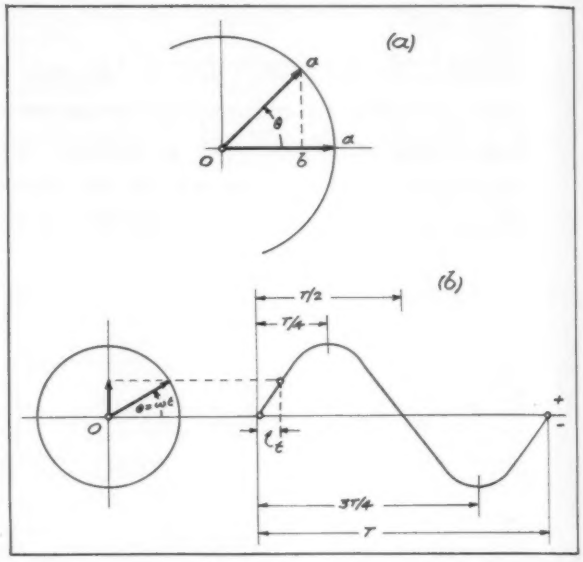


Fig. 134. Representation of the Function y = sin 2πnt.

$E = RI$, where I is the maximum value of the current.

(b) What is the e.m.f required to maintain a current $i = I \sin wt$. in a circuit having an inductance of L henries?

A current passing through an electric conductor gives rise to a magnetic field which is given by the expression $F = Li$, i being the current strength and L a constant known as the inductance of the conductor. L is dependent on the form of the conductor and, for the same length, is greater if this is in the form of a coil. The presence of iron, such as the core of an electromagnet, increases the inductance.

If $i = 1$, then L is the magnetic flux produced by unit current. Inductance creates a back e.m.f., opposing the establishment of a current in a circuit, and time is required after starting for the current to reach its final value.

If i_1 and i_2 are the current strengths at the beginning and end of a very small interval of time, t, the change in the flux is $L(i_2 - i_1)$ and the average rate of change of this is $L(i_2 - i_1)/t$. This may be written $L \times (di/dt)$, and L multiplied by the rate of change of current is obviously an e.m.f. since it represents a varying magnetic flux.

The e.m.f. due to the inductance of a conductor (resistance neglected) is $e = L(di/dt)$. Now,

$di/dt = wI \cos wt$,

$= wI(\sin wt + 90°)$; therefore

$e = wLI \ (\sin wt + 90°)$

or the e.m.f. is 90° ahead of the current and its maximum value is wLI.

(c) Resistance and Inductance in Series.

The total e.m.f. is clearly the sum of cases (a) and (b) and

$e = RI \sin wt + wLI \sin wt + 90°)$

The e.m.f is thus made up of two components at right angles to one another, Fig. 135 (a).

In the equation $e = Ri + L(di/dt)$. (1)

put $D = d/dt$, then

$e = (R + LD)\ i$ ..... (2)

now $i = I \sin wt$ and

$Di = DI \sin wt$ ..... (3)

Differentiating this again

$D^2i = D^2I \sin wt$

$= -w^2I \sin wt$ ..... (4)

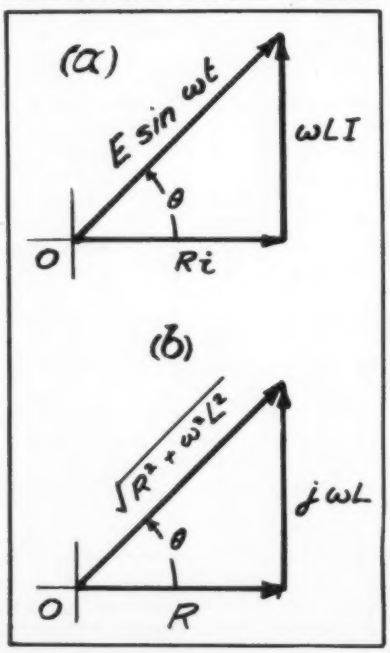


Fig. 135. E. M. F. and Impedance Triangles.

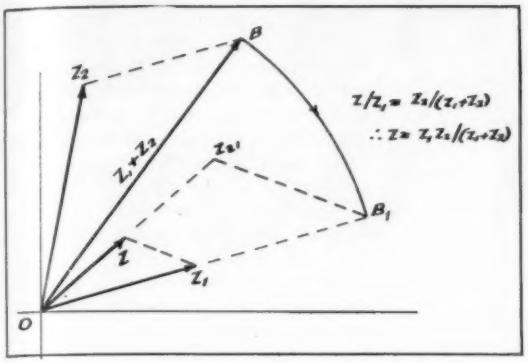


Fig. 136. Geometrical Construction Giving the Joint Impedance of Z_1 and Z_2.

$D^2 = d^2I/dt^2$; therefore,

$D^2 = -w^2$ or $(\sqrt{-1}.w)^2$

$D = \sqrt{-1}.w = jw$.

Substituting this in (2),

$e = (R + jwL)i$ or

$R + jwL = e/i$, the impedance of the circuit.

The "size" or absolute length of the

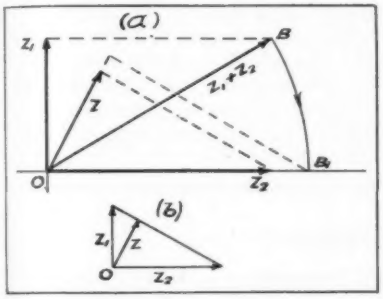


Fig. 137. Geometrical Construction for the Joint Impedance Z of Two Vectors Z_1 and Z_2 in Quadrature With One Another.

impedance vector is $\sqrt{R^2 + w^2L^2}$, and its angle θ is $\tan^{-1} wL/R$, Fig. 135 (b).

(d) What is the e.m.f. required to maintain a current $i = I \sin wt$ in a condenser of capacity K farads?

Let q be the charge at any instant so that $q = Q \sin wt$. The required e.m.f. will be $e = q/K = (Q/K) \sin wt$.

But the varying charge is the result of a current $i = dq/dt = wQ \cos wt = wQ \sin (wt + 90°)$ and, therefore, the voltage is 90° behind the current. The impedance vectors of a pure inductance and a pure capacity are thus seen to be along the y axis but in opposite directions.

VECTOR IMPEDANCES IN PARALLEL: If two impedances, p and q, are in parallel, their joint impedance

$r = pq/(p + q)$; therefore $r/p = p/(p + q)$.

Fig. 136 is a geometrical construction giving Z the joint impedance of Z_1 and Z_2. $(Z_1 + Z_2)$ is obtained by completing the parallelogram formed by Z_1 and Z_2.

Rotate the triangle OZ_2B so that OB takes up the position OB_1. From Z_1

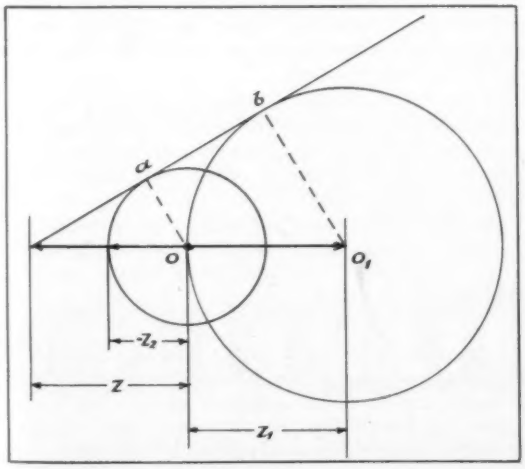


Fig. 138. Construction for Obtaining the Joint Impedance of Z_1 and $-Z_2$.

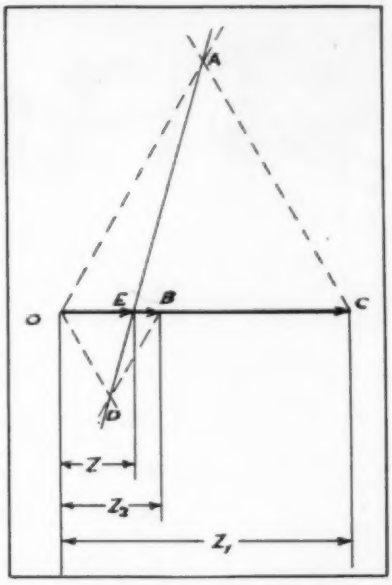


Fig. 139. Construction for Obtaining the Joint Impedance of Two Vectors Z_1 and Z_2, Coincident in Direction.

draw a line parallel to B_1Z_{21}, cutting the line OZ_{21} in Z. OZ is the joint impedance required.

Proof:

By similar triangles,

$Z/Z_1 = Z_2/(Z_1 + Z_2)$; therefore

$Z = Z_1Z_2/(Z_1 + Z_2)$.

A special case arises where Z_1 is in

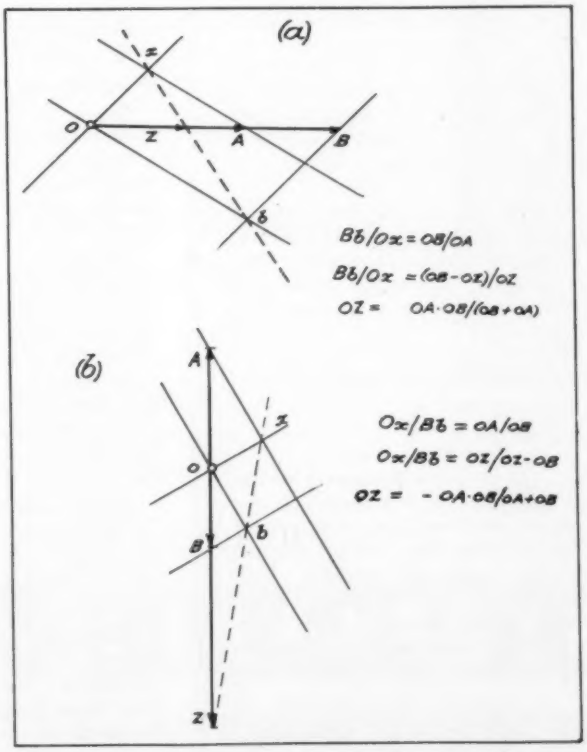


Fig. 140. Construction for Obtaining the Joint Impedance of Z and Z_1 in Phase or 180° Apart.

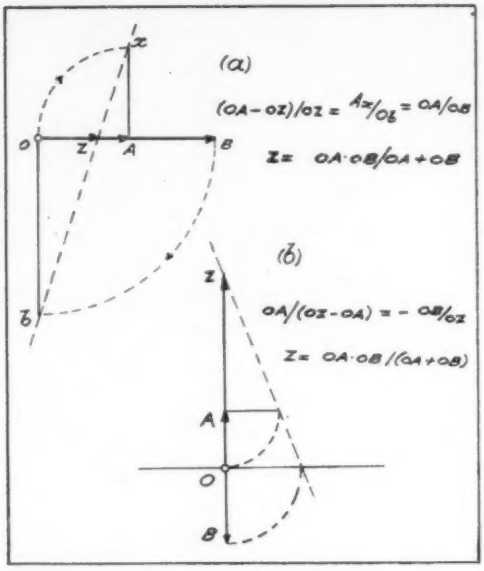


Fig. 141. Another Method for Obtaining the Joint Impedance of Z and Z_1 in Phase or 180° Apart.

quadrature with Z_2, Z_1 being a pure inductance, say, and Z_2 a pure resistance. The construction is exactly the same as that followed in the previous case as is seen by inspection of Fig. 137 (a).

The work is considerably simplified by proceeding as in Fig. 137 (b). The diagonal drawn from Z_1 to Z_2 is the vector sum $Z_1 + Z_2$ of the two vectors and by similar triangles, $Z/Z_1 = Z_2/(Z_1 + Z_2)$ as before. All that is necessary is to let fall the perpendicular from the hypotenuse of the triangle to O.

The special case where the vectors have opposite directions, such as would be furnished by a pure inductance and a pure capacity, is illustrated in Fig. 138. The construction to obtain Z is as follows:

Describe circles with radii Oa and Ob on the two impedances. The tangent touching the circles at a and b cuts the horizontal line O_1, O, at a point which gives the value Z required.

Proof:

$Oa/O_1b = -Z_2/Z_1$

$Oa/O_1b = Z/(Z + Z_1)$; therefore

$-Z_2/Z_1 = Z/(Z + Z_1)$

Multiplying across

$$Z = -Z_1Z_1/(Z_1 + Z_2).$$

Fig. 139 gives a construction for the joint impedance of two vectors Z_1 and Z_2 having the same angle with respect to the reference line. On OC and OB construct equilateral triangles OAC and OBD and join the apex A to the apex D. Then, $AC/OD = Z_1/Z_2$, since the triangles are similar. Triangles AEC and OED are also similar; therefore,

$AC/OD = (Z_1 - Z)/Z$.

$Z_1/Z_2 = (Z_1 - Z)/Z$ and, rearranging

$$Z = Z_1Z_2/(Z_1 + Z_2)$$

Fig. 140 (a) and Fig. 140 (b) represent a further method of obtaining the joint impedance of two vectors either in phase or 180° apart. It consists in drawing two pairs of parallel intersecting lines and then a diagonal through the rhombus formed by the system of lines. The principle on which the construction is based will be obvious from the figure. Fig. 141 is still another construction the principle of which will at once be apparent.

All of the foregoing illustrations are based on a single frequency but communication engineers usually desire to know the response of an impedance or combination of impedances over a band of frequencies. This can generally be obtained by simple graphical means such as those which are treated in detail in the succeeding section.

▼ ▼

Bell System Gains 22,600 Telephones in July

The American Telephone & Telegraph company reported August 5 a net gain of 22,600 telephones in service in the principal telephone subsidiaries of the Bell System during July, compared with a net gain of 27,500 instruments in the same month last year.

The total of all telephones in operation throughout the Bell System on July 31 was estimated at 15,004,000. The peak of telephone installations was reached in 1931 when 15,180,000 instruments were in use.

PLODDERS

By MISS ANNE BARNES

Traveling Chief Operator, Iowa Independent Telephone Association, Des Moines, Iowa

A HOUSE is not much of a house, so far as stability is concerned, unless it has a foundation under it; and a foundation for a house serves no purpose unless a house is built on it.

Many plodding workers remain plodders because they lack *push* to get above the foundation work of their job which earns for them simply a living. No wonder they grow discouraged and voice the sentiment of a despondent rooster who one day leaned his head against the barn door and clucked to himself: "What is the use of it all? Eggs yesterday, chickens today, feather dusters tomorrow."

There are other plodders who begin at the bottom and build their foundation systematically and solidly. By so doing day after day, they fit themselves for better positions higher up. During their plodding experience they are absorbing facts about the business which proves invaluable to them later on.

So many young people enter business life who are averse to starting with the plodding humdrum routine at the bottom. They exclaim loftily, "My education has fitted me to be more than an ordinary plodder who has no educational advantages." What such folks really have in mind is a showy, titled position.

Hetty Stone was like that. She depended entirely on personality and pull rather than *push*. And by some streak of luck she arrived above the foundation in short order. But her personality and pull did not aid her when she encountered problems in her work as an executive.

MORAL: "The every-day cares and duties which men call drudgery, are the weights and counterpoises of the clock of time, giving its pendulum a true vibration, and its hands a regular motion and when they cease to hang upon the wheels the pendulum no longer swings, the hands no longer move, and the clock stands still."—Longfellow.

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These statements regarding C-A-X operation summarize actual case records of over 600 C-A-X's in daily operation throughout the United States. On such factual evidence, scores of C-A-X's will be purchased this year—and scores of small exchanges will thereby be transformed from money-losers into money-makers. Will yours be one of them?

Write today for literature describing C-A-X equipment. Or, better yet, send us full information about your small exchange, and we will show you, in actual figures, just what savings C-A-X operation can effect for you!

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IN THE NATION'S CAPITAL

By FRANCIS X. WELCH
Special Washington, D. C., Correspondent for TELEPHONY

PRESIDENT'S TWO APPOINTMENTS to FCC last week said to indicate an attempt to head off proposed investigation of FCC in connection with that of the radio industry. Background of Chairman McNinch of Federal Power Commission who becomes temporary chairman of FCC under appointment by President. Comments on internal differences in the FPC and the FCC

IN THE LAST issue of this department, it was strongly intimated that Senator Wheeler's sudden interest in the revival of Senator White's resolution to investigate the radio industry and, incidentally, the FCC was due in no small part to the Montana gentleman's growing desire to show the Democratic party that its New Deal idol's feet are made of clay.

Now comes the counter offensive move from the White House, which seems to bear out this diagnosis. It is the President's drafting of Chairman Frank R. McNinch from the FPC to do a fireman-save-my-child act over at the FCC. In short, the President is desperately trying to stall off a very smelly investigation of the radio industry which shows great danger of doubling back on the FCC membership and hence, by inference, upon the Administration itself.

Further than that, the White House well knows that if Senator Wheeler in his present mood has anything to do with such an investigation (and as chairman of the Senate interstate commerce committee he would virtually have control of it), the Montanan will pull no punches in showing up New Deal appointees if the evidence should trend in that direction.

IN SHORT, the last thing on earth the Administration wants at this time is an investigation of a New Deal agency conducted by the embittered Montana Senator. In the first place, it might very well show up the Administration in an unfavorable light, to say the least. In the second place, it would give Wheeler a chance to play hero at his old favorite game of fearless prosecutor.

There are few senatorial investigators who can stack up with Wheeler—now that Senator Black has retired to the judicial monastery. Senator Clark of Missouri and Senator Nye of North Dakota are pretty good at it, but they are the members of the very band of court bill rebels headed by Wheeler; so that is small comfort for the New Deal, which now finds itself without a champion in its own party available for bloodhound assignments. Only Progressive Bob La Follette of Wisconsin is left to carry on the work of the redoubtable Black.

BUT COMING back to the McNinch shift and the Craven appointment to the FCC, it is apparent that the White House hopes to be able to clean house and put things in order over at the FCC before Sherlock Wheeler and the rest of his inquisitorial associates come snooping around looking for trouble. Thanks to some neat blocking and tackling by the Young Turks (freshmen pro-New Deal Senators), the White resolution was barely staved off until the bell rang for session adjournment.

Now the White House hopes that its Tarheel trouble-shooter will make such a fast and slick clean-up that next January President Roosevelt can proudly open the door of the FCC to the firm of Wheeler, White & Wiggleworth and say: "Come in and see for yourself, gentlemen; there is nothing wrong with this establishment, now."

Whether the new chairman will be so successful in bringing what the newspapers refer to as "order out of chaos" is something else again. In fact, it can scarcely be said that all is peace, sweetness, and light in his own bailiwick at the FPC.

There has been a suppressed feud going on there between Chairman McNinch himself and Commissioner Manly for the last year and a half—perhaps longer. Now the baby member of the FPC, John R. Scott of Indiana, appointed only last July, is reported to be kicking up something of a fuss with the commission's legal division, and where it will stop no one knows.

THERE is this much to be said, however, for the FPC as compared with the FCC: it always had the decency to shut the door and pull down the shades while domestic battles were going on. This is in sharp contrast to the tendency of certain FCC officials to rush into print at the slightest provocation and often without it, as far as the very human eye of this writer could see.

The FPC has also been doing a good job of organizing a colossal program of Federal control for the entire power industry, notwithstanding considerable family quarreling. Whether all or most of the credit for this is due to Chairman McNinch is debatable, but when one considers the vigilant watch the FPC has kept on all Federal power matters, its loyalty to the President, the dogged persistence in legislation and its efficient and prompt reporting on several surveys which Congress has loaded on to the FPC in addition to its routine duties, it is almost entitled to a little display of internal temperament.

TWO OF THE FPC members, Commissioners Seavy and Draper, are veteran state commissioners. Hardworking and conscientious, they fitted into their regulatory duties easily and provided little friction. The fifth member of the commission

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by LAURENCE J. CORBETT

Member, American Institute of Electrical Engineers, Fellow, American Association for the Advancement of Science

is the **only one** combining under one cover the essentials of this important subject involving many divisions which have been treated separately and occasionally in numerous reports and articles. It includes results of the author's researches, fitted into a broad survey of the principles applying to Inductive Coordination. It is NOT a compilation of catalog data or undigested reports. It is a carefully developed treatment and clarification of a subject which, though important, has received too little attention. Many diagrams illustrate the practical application of the principles in a manner very readily followed. The variation in values of factors is presented, and theory and practice under these conditions are carefully differentiated.

CHAPTER HEADINGS:

I. Elements of the Problem.
II. Susceptiveness and Coupling Factors.
III. Effects of Conductor Arrangements.
IV. Transpositions.
V. Coordinated Transpositions.
VI. Telephone Circuits on Power Structures.
VII. Power System Wave Shape.
VIII. Transformer Exciting Current and Bank Connections.
IX. Flow of Residual Currents.
X. Control of Residuals.
XI. Miscellaneous Values and Remedial Measures.
XII. Susceptiveness Factors.
XIII. Low Frequency Induction.
XIV. Miscellaneous Methods.

Appendices • Bibliography • Index

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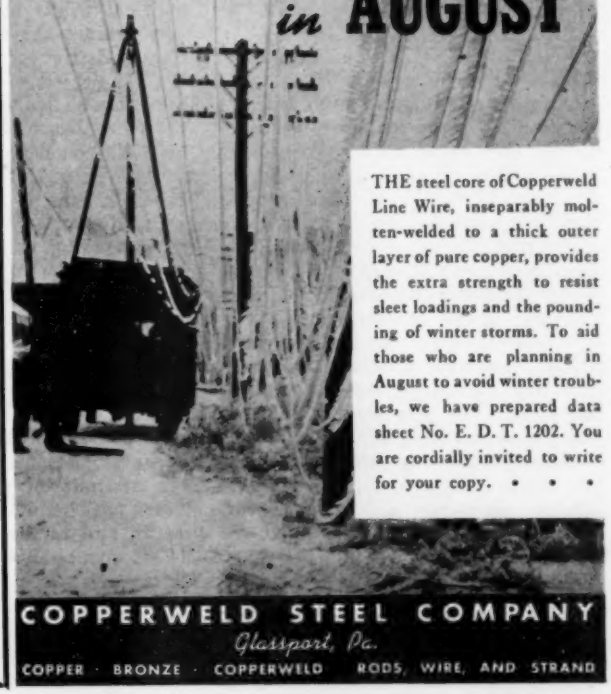

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whose term expired in June, Commissioner Drane, received his job following his retirement from Congress, where he left no noticeable footprints on the sands of time. He was not particularly active in office.

This left the balance of the power commission in the hands of Chairman McNinch and its former vice chairman, Manly. They were quite opposite in temperament. McNinch was the brilliant, articulate, even fiery, chief who made excellent political speeches when called upon to expound the New Deal power policies or chastise the power trust. Manly was the cold-blooded, logical executive type, who is said to have worked wonders in organizing and directing the onerous duties piled on the FPC by Congress.

Prima donna trouble is reported to have developed between the two. When the TVA-Commonwealth & Southern power pool discussions were hot on the White House griddle last winter, McNinch and Manly were supposed to have clashed head on. Shortly after, Manly was allowed to become the target of an organized labor attack on some minor dismissal of a commission employe. After that the wise men around Washington were saying that Manly's "number was up."

And so it seemed, when Manly was suddenly "busted" from the vice chairmanship which then went to Commissioner Seavy. Yet since then Manly continues in office and there is rumor that his influence is returning in some degree. Time alone will tell.

THIS MODEST bit of FPC linen is washed here just by way of explaining why so many eyebrows were raised when McNinch was sent to the FCC to clean up the politics there and restore peace. Unless the President's idea was to fight fire with fire, some of the cynics are saying that McNinch may even complicate matters. In other words, it seems to some observers like sending an Orangeman to stop an Irish riot.

Whatever may be his executive ability, however, there are two qualities that stand out about Frank R. McNinch: (1) His intense loyalty; (2) his penetrating grasp on difficult problems. Meeting him in person, one finds McNinch soft-spoken and affable. In public address, however, he is a firebrand of the good old Southern variety and can make sharp quick knives out of nouns and drive them home with salty adjectives. Power company executives have good reason to respect his hard-hitting ability on New Deal power program.

His background reveals an interesting and meteoric career. He was born in Charlotte, N. C., in 1873, and until he was well over 50 years of age gave evidence of living and dying there—a talented, respected small-town lawyer who served two terms as mayor of his home community.

In 1928, however, the Democratic party nominated Al Smith for President, and immediately the Dry, Protestant Democracy of the Old South was torn asunder by the opposing forms of party loyalty and the Bishop Cannon school of thought. Mr. McNinch chose the latter and became a leading and active "Hoovercrat." Well, the voters in North Carolina, as well as throughout the nation, vindicated his political acumen, and so it was that the election of Hoover found the Republican party in 1929 with a number of obligations to pay south of the Mason-Dixon line.

About this time the Federal Power Commission, which had previously consisted of three cabinet officers acting as members ex officio, was reorganized as a five-man, full-time board. The law also provided that no more than three members should belong to the same political party, and as McNinch was still technically a Democrat, President Hoover was very favorably disposed to his appointment in 1930.

AS SOON as he was in office, however, Commissioner McNinch once more employed his uncanny scent of the shifting direction of political winds by conducting a revolt against the Hoover power policies and Hoover's FPC Chairman, Dr. George Otis Smith. This rebellion was displayed in a couple of vigorous dissenting opinions signed by McNinch which shocked and dismayed President Hoover and the good Dr. Smith.

But Chairman McNinch knew what he was doing and he kept plugging away at the power utilities with such persistence that by the time President Roosevelt was swept into office in 1932, McNinch was out in front of the anti-power trust parade—and he has stayed pretty much in that position ever since. It will be easily understood, therefore, why President Roosevelt became so inspired with the attitude of Commissioner McNinch that he ignored his Hoovercrat origin and forthwith appointed him as his own chairman for the FPC in 1933.

This in itself is remarkable, in view of the political retribution that has overtaken other Deep South Democrats who deserted the party for Hoover in 1928. There was the former Senator Simmons in McNinch's own state, Senator Heflin of Alabama, and others who have gone down with the changing tides of political fortune.

Senator Bailey of North Carolina threatened to raise this party desertion issue against McNinch on the occasion of his reappointment as chairman to the FPC, but for some unknown reason the confirmation battle did not materialize. Since then McNinch has been so closely identified with President Roosevelt on all power matters that he is certainly now safely gathered back to the Democratic fold without fear of reprisal.

THREE MONTHS is the period tentatively assigned for Mr. McNinch's sojourn with the FCC. While there is good reason to believe that it may run over that period because of the difficulties of the problems before him, there is no reason for crediting the rumor that the McNinch shift will be made permanent.

In the first place, McNinch's heart is with the Federal power program. He has worked on it tirelessly. He has no special interest in communications and knows little about them—admits as much. In other words, McNinch would probably balk if the President tried to keep him over at the FCC.

Next we must consider that the President's national power program is very much involved with the Norris "seven TVA's" bill which comes up for consideration, and possibly for passage, at the next session. Somebody over at the FPC will have to go to bat for the "seven TVA's" bill, and without McNinch, the attitude of the rest of the commission is rather lukewarm towards the bill. (The position of the newest member, Scott, is unknown as yet.) Besides, there is no one else on the FPC who is a good "front" man. McNinch fits into that role perfectly.

Therefore, it is logical to assume that the Administration will need McNinch back at the FPC before the end of next January. Finally, there are the Western congressmen who are demanding patronage representation on the FCC. They allowed the McNinch appointment to go through with the distinct understanding that it was to be a temporary arrangement. Otherwise, there is sure to be some mighty yelping at Capitol Hill.

The Craven appointment is distinctly a merit appointment. As Under Secretary of the Navy during the Wilson Administration, President

(*Please turn to page* 34)

New Members of FCC Confirmed By Senate

APPOINTMENTS BY President Roosevelt of two new FCC commissioners arouse speculation regarding proposed investigation of radio industry and FCC. Resolution of investigation not acted upon but may be brought up at next session of Congress in January. Comments concerning the two new FCC members

AS STATED in last week's issue of TELEPHONY, the President sent to the Senate the nominations of two new members of the Federal Communications Commission on August 17. They were referred to the Senate interstate commerce committee for consideration prior to action on the Senate floor. Favorable reports were made by the committee and both nominations were confirmed by the Senate before adjournment August 21.

Criticisms of FCC in House and Senate

President Roosevelt's action in making the appointments now, according to newspaper dispatches, is believed to have been taken to head off the proposed investigation of the FCC, in connection with radio broadcasting, by the Senate interstate commerce committee. However, Senator Burton K. Wheeler, chairman of the interstate committee which reported favorably the resolution introduced by Senator Wallace White, notified the Senate he intended to carry through the investigation at the next session.

One of the new commissioners, Frank R. McNinch, is temporarily transferred from his position as chairman of the Federal Power Commission, according to Stephen T. Early, the President's press secretary, to "put the commission's affairs in order." Mr. McNinch, said to be one of the President's closest advisors, is to serve as chairman of the FCC.

The other new commissioner, T. A. M. Craven, has been chief engineer of the commission since November 20, 1935. He is highly regarded for his technical ability as a communications engineer.

Mr. Craven's appointment is looked upon as a blow to the prestige and influence of Commissioner George Henry Payne, who has been at loggerheads with Mr. Craven for some time in the bitter internal conflict which has been going on in the commission. Mr. Craven succeeds Irvin Stewart, whose term expired July 1.

The announcement of these appointments to the FCC followed a long period of dissent among the commissioners themselves and mounting criticism of the commission as inefficient, unfair and political.

This criticism, frequently voiced in the House amid demands for a Congressional investigation, culminated recently when the Senate interstate commerce committee voted a favorable report on a resolution by Senator Wallace White of Maine for an investigation (TELEPHONY of August 21).

Representative Bacon of New York asked the House August 21 to name a committee to investigate a "vicious and arrogant lobby," which he said "influences the radio industry and attempts to control the Federal Communications Commission."

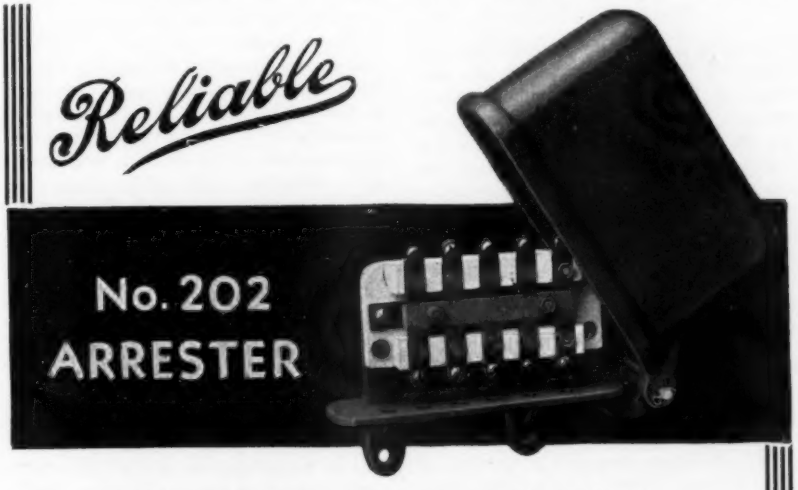
He proposed that the inquiry include the editors, publishers and employes of The Broadcasting Magazine, a trade journal, which, he said, "has been represented as the channel of communication of the lobby's views."

The criticisms have been largely directed at the commission's radio division. Senator White's resolution provides for a thorough investigation of the broadcasting companies and of the policy of the commission toward them.

Charges Which May Be Investigated by Committee

Senators favoring the investigation asserted privately that some of the charges made against the FCC involve members of President Roosevelt's family who have been accused of exerting political influence to obtain favors for radio interests.

Other charges which have been



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brought to the attention of senators concern Charles Michaelson, the $20,000 a year publicity chief of the Democratic national committee who recently took a lucrative job with Powell Crosley, whose 500,000-watt station at Cincinnati was in difficulties with the FCC.

"The commission, according to all reports that have come to us, is a political football and has been used for that purpose," said Senator Wheeler. "The best evidence is that the senator from Maine, who knows more about radio than any man in this body, introduced a resolution calling for an investigation and the committee on interstate commerce reported it favorably.

"I'm in favor of confirming Mr. Craven; but I want it understood that at the next session, the committee on interstate commerce should seek to make a thorough investigation of the commission."

When Senator Edward R. Burke suggested that the placing of McNinch and Craven on the commission might "straighten out its affairs" and make an investigation unnecessary, Senator William E. Borah disagreed. The persons guilty of misconduct in the past should be punished, he said. Senator Burke agreed and said he favored the investigation, as did Senator David I. Walsh.

Commander Craven Highly Regarded as Radio Expert

Both Republicans and Democrats paid tribute to Mr. Craven as the outstanding radio expert in the country. He has been serving as chief engineer for the commission, a $9,000 job, for which he gave up a consulting business earning a gross income of $49,000 a year at the request of the President.

The new chairman of the commission was born in Charlotte, N. C., April 27, 1873. He practiced law in Charlotte, commencing in 1900, and was a member of the North Carolina House of Representatives in 1905. He served as mayor of Charlotte and commissioner of finance for two terms from 1917 to 1921.

Mr. McNinch has been a member of the Federal Power Commission since 1930 and its chairman since 1933. It was made clear at the White House that Mr. McNinch will be on leave of absence from the power commission without pay and will resume his post when his work with the FCC is done.

It is expected that Mr. McNinch will return to the FPC along in December, at which time President Roosevelt will make another appointment to fill the remainder of the term of the late Mr. Prall. That expires in July, 1942. Mr. McNinch will take his post with the FCC about September 10, as matters with the FPC will occupy his attention until then.

Lieutenant-Commander T. A. M. Craven was born January 31, 1893, in Philadelphia, Pa. He was graduated from the U. S. Naval Academy, Annapolis, with the class of 1913.

His first assignment after graduation was as radio officer on the USS Delaware, 1913-1915, during the Mexican campaign. During the next two years he was fleet radio officer of the U. S. Asiatic fleet. For the next three years he was in charge of the United States naval coastal and transoceanic operations and during this period had a number of special assignments.

These included serving as U. S. Naval representative at the Provisional Interallied Communication conference at Paris, France, in 1919; Naval representative on U. S. government interdepartmental board in 1919 to arrange for collection and distribution of meteorological data; U. S. Naval radio technical advisor at International Conference on Electrical Communication in Washington in 1920; and chairman of its sub-committee on wave-length allocation.

From 1921 to 1923 Commander Craven was battleship force radio officer; fleet radio officer, U. S. Atlantic fleet, and fleet radio officer, U. S. fleet. He served as U. S. Naval representative at the conference of the radio technical committee on International Radio Communication at Paris, France, in 1921.

Commander Craven was in charge of the radio research and design section, Bureau of Engineering during the period 1923-1926, and was a member of the inter-departmental radio advisory committee. He was radio technical advisor for radio frequency allocation at the International Radio Conference in Washington in 1927 and resigned from the Navy in 1930 to engage in private radio consulting engineering. He became chief engineer of the FCC November 20, 1935, succeeding Dr. C. B. Jolliffe.

During his governmental service Commander Craven's work attracted favorable attention. He received a special letter of commendation for meritorious service during the World War. In 1927 he received a letter of commendation from the Secretary of Navy for his work at the International Radio Conference in Washington. He has made notable contributions to radio development in his writings. Among other things he collaborated with Captain Hooper in writing Robinson's Manual of Radio Telegraphy and Radio Telephony. He is also the author of various technical essays on naval radio communications.

COMING CONVENTIONS

The Illinois Telephone Association, Hotel Pere Marquette, Peoria, September 22 and 23.

South Dakota Telephone Association, Hotel Cataract, Sioux Falls, September 28 and 29.

Independent Pioneer Telephone Association of the United States, Hotel Stevens, Chicago, October 14.

United States Independent Telephone Association, Hotel Stevens, Chicago, October 12, 13, 14 and 15.

▼ ▼

Company's Collection Methods Bring Results

Great confusion arose in Pigeon Falls, Wis., one Sunday afternoon in July when 150 subscribers of the Pigeon Valley Telephone Co., whose accounts for rent were not paid on the due date, July 1, were refused service. Only about 50 subscribers were in good standing.

The directors, at their annual meeting had voted to establish a system whereby accounts should be paid quarterly, with the payment for the first two quarters due July 1, and voted to discontinue service to those whose accounts were not paid by that date.

The next day, on Monday, more than half of the 150 subscribers were reinstated by making settlements with the company and about $240 were received in rentals and toll charges. Of the number paying their rent, only three ordered their telephones out. The rental charges are $13 annually and a large number of subscribers have been accustomed to paying telephone dues annually and did not take the notices sent literally.

▼ ▼

Service to Be Improved at Alhambra, Calif., Exchange

The Southern California Telephone Co. has appropriated $500,000 to be expended in betterment of service facilities at its Alhambra exchange. Previously $110,000 were spent in constructing an addition to its exchange building and in refacing the original structure.

The larger part of the money will be expended in replacing manual service with dial service for the 5,000 stations served. The first cutover is scheduled for late November, when all of the business stations and a part of the residence subscribers will be attached to the dial service.

Financial Operating News and Data

Recent Prices of Telephone Securities

(These quotations as of August 21, 1937, are supplied by Telephone Securities Corp., 120 S. La Salle St., Chicago, Ill.)

TELEPHONE BONDS

	Bid	Asked
American Utilities Service Corp., 6s, 1964	77	79½
Ashland Home Telephone Co., 4½s, 1961	103¾	..
Associated Public Utilities Corp., 5s, 1947	68	70
Associated Telephone Co., Ltd., 4s, 1965	104¾	106½
Associated Telephone & Telegraph Co., 5½s, 1955	82	85
British Columbia Telephone Co., 5s, 1960	105½	..
California Water & Telephone Co., 5s, 1965	102	104
Central Electric & Telephone Co., 5s, 1955	98	100
Central Iowa Telephone Co., 5½s, 1947	101¾	103¾
Central Telephone Co., of Delaware, 6s, 1938	12½	15¼
Citizens Independent Telephone Co., 4¼s, 1961	101	103¼
Commonwealth Telephone Co., of Pennsylvania, 5½s, 1945	88½	93
Commonwealth Telephone Co., of Wisconsin, 4s, 1966	97¾	99¾
Community Telephone Co., income 5s, 1949	24	26½
Cumberland Valley Telephone Co., 5s, 1966	98¼	100¼
Florida Telephone Corp., 6s, 1945	91	93½
Florida Telephone Corp., 6s, 1954 second mortgage	65½	..
Gary & Co., Theodore, 6% income notes, $5 par	2½	3½
Home Telephone & Telegraph Co., of Fort Wayne, Ind., 6s, 1943	104¾	..
Home Telephone & Telegraph Co., of Fort Wayne, Ind., 5½s, 1955	104¼	..
Indiana Associated Telephone Co., 4½s, 1965	104	106
Indiana Central Telephone Co., 5½s, 1938	85¾	88¾
Illinois Communities Telephone Co., 6s, 1949	61	64
Illinois Commercial Telephone Co., 5s, 1948	100	102¾
Illinois Commercial Telephone Co., 5s, 1960	99¼	101¼
Inland Telephone Co., 6s, 1948	90	93¼
Interstate Telephone Co., of Idaho, 5s, 1961	100¼	103
Interstate Telephone & Telegraph Co., 5½s, 1953	93	96¼
Investors Telephone Co., 3s, 1961	51¾	54½
Iowa Illinois Telephone Co., 5½s, 1949	49	53
Jamestown Telephone Corp., 5s, 1954	103½	105
Kansas Telephone Co., 6s, 1939	flat	42 ..
Keystone Telephone Co., of Philadelphia, 6s, 1951	99	101
Keystone Telephone Co., of Philadelphia, 5½s, 1955	98½	100¼
La Crosse Telephone Co., 5½s, 1948	101½	104
Lexington Telephone Co., 6s, 1944	100¼	102½
Lorain Telephone Co., 5s, 1958	101¼	103
Michigan Associated Telephone Co., 5s, 1961	102	104¼
Middle States Telephone Co., of Delaware, 6s, 1947	99½	101¾
Middlewestern Telephone Co., 6s, 1943	70	73
Missouri Telephone Co., 4¼s, 1961	99½	102
Ohio Associated Telephone Co., 4½s, 1966	99	101¾
Ohio Central Telephone Co., 6s, 1947	93½	96¾
Pennsylvania Telephone Corp., 4s, 1965	104	106½
Pike County (Ind.) Telephone Company, 6s, 1946	flat	41 ..
Pike County (Ill.) Telephone Co., 6s	102	..
Platte Valley Telephone Corp., 6s, 1947	100	103
San Angelo Telephone Co., 5s, 1958	102	..
Santa Barbara Telephone Co., 3½s, 1966	98½	101
Southwestern Associated Telephone Co., 5s, 1961	96	99
Southwestern States Telephone Co., 6s, 1948	63½	66
Southwestern States Telephone Co., 6s, 1949	60½	63½
Standard Public Service Co., 6s, 1948	58	60½
Telephone Bond & Share Co., 5s, 1958	74¾	77¼
Telephone Service Co., of Ohio, 5s, 1953	82	84¼
Tri-County Telepnone Co., 4½s, 1956	100½	103
United Telephone Co., of Delaware, 6s, 1948	89	92
United Telephone & Telegraph Co., 5½s, 1953	99¾	101¾
United Telephone & Telegraph Co., 6s, 1953	100¼	102¼
Wabash Telephone Co., 4½s, 1956	99¼	102
Warren Ohio Telephone Co., 6s, 1942	98½	101
West Coast Telephone Co., 5s, 1953	94½	97
Western Light & Telephone Co., 5s, 1954	99¾	101¾

PREFERRED STOCKS

	Bid	Asked
Associated Telephone Co., Ltd., $1.25	23½	25
Associated Telephone & Telegraph Co., 7% first	37¾	42½
Associated Telephone & Telegraph Co., $6 first	36½	41
Associated Telephone & Telegraph Co., $4 cumulative	8½	12¼
Bell Telephone Co. of Pa., 6½% $100 par	117	121½
California Water & Telephone Co., 6% $25 par	22¾	25
Central Electric & Telephone Co., $50 par	30	33
Community Telephone Co., $2 cumulative, no par	1½	3
Commonwealth Telephone Co., of Wisconsin, 6%, $100	90	94
Continental Telephone Co., 7% first	91	95
Continental Telephone Co., 6½% first	88	93½
Diamond State Telephone Co., 6½% $100 par	110¼	114½
Empire Telephone Co., 6% cumulative, Class "A" $25 par	16	18¾
Florida Telephone Corp., 6% cumulative, $10 par	33½	..
Gary & Co., Theodore, first $1.60 pfd.	1½	2¾
General Telephone Allied Corp., 6% convertible	96½	99
General Telephone Corp., $3 convertible	45	48½
Home Telephone & Telegraph Co., of Fort Wayne, 7%, $50 par	50	53
Illinois Commercial Telephone Co., $6	83½	88
Interstate Telephone & Telegraph Co., first pfd., "A" 5% pfd.	54	59
Jamestown Telephone Corp., 5% cumulative, $100 par "A"	99½	..
Jamestown Telephone Corp., participating pfd., $100 par	99½	..
Keystone Telephone Corp., $4 cumulative, no par	21½	24½
La Crosse Telephone Co., 6% prior	95½	99½
Lexington Telephone Co., 6½% prior	82	85½
Lincoln Telephone & Telegraph Co., 6% cumulative $100 par	105	107
Lorain Telephone Co., 6% cumulative $100 par	98½	102
Middle States Telephone Co. of Illinois, 7%	93	97½
Mount Vernon Telephone Co., 7% cumulative $100 par	88	93
Northern Ohio Telephone Co., 4½% cumulative	100	103
Ohio Central Telephone Co., 7% first	50	54

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	Bid	Asked
Ohio Service Holding Corp., $5 pfd., $5 par	43	45¾
Pacific Telephone & Telegraph Co., 6% $100 par	140	143
Peninsular Telephone Co., 7% cumulative "A"	107	109½
Pennsylvania Telephone Corp., 6% cumulative	107	110
Rochester Telephone Corp., 6½% cumulative	110	..
The Southwest Telephone Co., 7%	1½	3½
Southwestern Bell Telephone Co., 7% cumulative pfd.	119	123
Telephone Bond & Share Co., 7% first	34	37½
Telephone Bond & Share Co., $3 first	23	..
Telephone Bond & Share Co., participating pfd.	12	..
Union Telephone Co., $1.70 pfd., $25 par	7½	9½
Warren Ohio Telephone Co., 7% $100 par	49	52½
West Coast Telephone Co., 6% $25 par	20	23
Western Light & Telephone Co., $1.75 first, $25 par	22¾	25
Wisconsin Telephone Co., 7% $100 par	115	118
COMMON STOCKS		
American Telephone & Telegraph Co.	168	172
Associated Telephone & Telegraph Co., Class "A"	4½	7
Bell Telephone Co. of Canada	167½	171
Central Electric & Telephone Co.	1¼	1¾
Empire Telephone Co.	5½	8
Florida Telephone Corp.	12	17¾
General Telephone Corp.	14	17
Home Telephone & Telegraph Co. of Fort Wayne, $50 par	62	65
Illinois Bell Telephone Co.	158	163
International Telephone & Telegraph Corp.	10	12
Investors Telephone Co., $100 par	17	20
Lincoln Telephone & Telegraph Co., Class "A"	34¼	37
Middlewestern Telephone Co.	3½	4¾
Mountain States Telephone & Telegraph Co.	143¾	144½
New England Telephone & Telegraph Co.	119	123
Northern Ohio Telephone Co.	63	..
Peninsular Telephone Co.	25½	28¾
Telephone Bond & Share Co., Class "A"	3	5¼
Telephone Investment Corp., no par	46	49
Western Light & Telephone Co.	1	1¾

▼ ▼

Michigan Bell Reports Big Station Gain in 1936

Last year total net earnings of the Michigan Bell before deducting interest and dividends, were $10,100,000, or 5.6 per cent on the cost of plant and other assets. Total operating revenues were $35,656,000, and operating expenses, $22,377,000. Operating earnings, after payment of taxes, were $9,947,000, and other earnings were $153,000.

Taxes amounted to $4,332,000, requiring 11.8 per cent of the gross revenue, or $7.74 per telephone in service. At the end of 1936 total assets of the company were $186,884,000.

The net gain of telephones during the year was 60,647, compared with 32,763 in 1935, bringing the number of telephones in service at the end of 1936 up to 594,502, which was 96,000 short of the peak reached in May, 1930.

Business telephones at the end of the year were back to 95 per cent of the peak development, compared with 82 per cent residence telephones. The average daily number of local calls during the year was 2,835,000, an increase of 11.6 per cent over 1935. Total number of long distance calls was 23,918,000, an increase of 19 per cent.

At the end of 1936 the plant investment was $178,077,000, according to the annual report. Gross construction expenditures in the current year are estimated at $16,552,000, or $5,216,000 more than was expended in 1936.

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Report of Associated Company, Long Beach, Cal.

The Associated Telephone Co., Ltd., Long Beach, Calif., recently made public its earnings statement for the 12 months ended April 30 in connection with the issuance and sale of 106,312 shares of cumulative preferred stock, $1.25 series, in April of last year.

Total operating revenues for the year ended April 30, 1937, were $3,301,718. After deducting operating expenses and taxes amounting to $2,351,823, the net operating earnings were $949,896. Adding $12,533 for other income and deducting $373,349 for interest and miscellaneous charges, there was a net income of $589,080.

This statement is for an interim period and is subject to adjustment and audit at the end of the calendar year 1937.

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Investors Company's Earnings Show Increase

Net income of the Investors Telephone Co. for the first half of 1937, after all charges and deduction of sinking fund requirements on the company's bonds, amounted to $25,093, equivalent to 63 cents a share on the common stock. This compares with $12,865, or 32 cents a share, for the last six months of 1936. No comparison with the first six months of 1936 is available, the company's operations since reorganization dating from July 1, 1936. The Investors company is successor to Standard Telephone Co. through reorganization proceedings under section 77-B of the bankruptcy act.

The income account follows:

	Six months ended June 30, 1937	Dec. 31, 1936
Oper. rev.	$571,000	$555,547
Oper. exp., maint. and tax	340,094	340,072
Deprec.	118,218	118,509
Net oper. inc.	112,687	96,965
Other inc.	1,882	1,310
Gross income	114,569	98,276
Inc. deduc.	76,950	78,979
Net inc.	37,619	19,297
S. F\	12,526	6,432
Bal. for div.	25,093	12,865
Per sh. com.	0.63	0.32

The $15,453 increase in operating revenues was augmented to a gain of $18,322 in net income before sinking fund provision by reduction in income deductions and depreciation, and a slight increase in other income.

Under the terms of the indenture securing the company's bonds, one-third of consolidated net income must be set aside for the retirement of bonds through purchase or redemption.

Charges to maintenance and depreciation for the first half of 1937 totaled $208,658, or approximately 35 per cent of operating revenues, as against $226,914, or 40 per cent of operating revenues, charged in the last half of 1936. The company's balance sheet as of June 30, 1937, shows current assets of $826,528, compared with $784,171 as of December 31, 1936, and current liabilities of $116,775 against $100,321.

Working capital as of the respective dates was $709,753 against $683,850. Cash as of June 30, 1937, totaled $588,561, more than five times current liabilities, against $571,018 as of December 31, 1936. In the company's report for the last six months of 1936 it was stated the large excess of current assets over current liabilities would be needed for rehabilitation of physical property which had not been properly maintained during the depression period, but in view of the fact that maintenance charges for the first six months of 1937 were only $90,440, against $108,425 for the last half of 1936, it is apparent that the increased maintenance program has not yet been inaugurated.

Under the plan of reorganization by which Investors Telephone Co. came into being, all preferred and common stock of Standard Telephone Co. was canceled, as well as demand notes and debentures held by that company's parent, Associated Telephone Utilities Co., now General Telephone Corp.

Debentures held by the public were liquidated by cash payments, and holders of each $1,000 of the 5½ per cent mortgage bonds of the old company received $1,000 first lien collateral trust bonds, 3 per cent, and ten shares of common stock of the new company.

Present capitalization consists of $3,939,500 of the 3 per cent bonds, a reduction of $14,000 since December 31, 1936, $499,900 6 per cent bonds of a subsidiary, and 39,535 shares of no par common stock. An initial dividend of 25 cents a share was paid on the common stock June 25.

▼ ▼

Recent Prices in the Metal Markets

New York, N. Y., August 23.—Copper steady, electrolytic spot and future, 14.00; export, 14.00@14.10. Tin steady; spot and nearby, 59.50; futures, 50.12½. Lead steady; spot New York, 6.50@6.55; E. St. Louis, 6.35. Zinc steady; E. St. Louis spot-future, 7.25.

Commission and Court Activities

Mutual Company of Honolulu Files with SEC

The Mutual Telephone Co. of Honolulu, Hawaii, a telephone and radio company, has filed a registration statement under the Securities Act of 1933 covering 67,569 shares of $10 par value capital stock to be offered first to stockholders at $10 a share.

Any unsubscribed shares will be sold at auction at an estimated maximum of $30 a share and the excess of $10 a share distributed to stockholders. Proceeds received by the company will be used for the repayment of a bank debt and for plant equipment.

▼ ▼

Handset Charge Limited For Ohio Independents

The Ohio Public Utilities Commission issued an order August 16 to 34 Independent telephone companies to reduce from an unlimited period to two years the 25-cent monthly charge for handset telephones.

It is provided further that for subscribers who have paid the sum of $6.00 or more, the excess charge shall cease, and the subscribers now using such equipment shall continue to pay the same only until such sum has been paid.

The commission in entering the order pointed out:

"That the companies have by their present system of charges deterred a general usage of monophone equipment by the imposition of charges in excess of prevailing charge for desk equipment, and that the average annual operating and maintenance expense for the maintenance and operation of service to subscribers with such monophone equipment is not sufficiently great to justify the present continuous surcharge for such equipment."

The order does not apply to Class C and D telephone companies nor to magneto telephone service furnished by Class A and B telephone companies, but the fixing of rates of handset subscriber station equipment upon magneto systems is reserved for specific consideration of individual applications by companies of these classes, excepting the Ohio Bell Telephone Co. and the Cincinnati & Suburban Bell Telephone Co.

The commission also granted the companies 15 days within which to show cause why final order shall not be entered by the commission and directed them to file new schedules covering handset equipment service by October 1.

The companies were granted permission to limit new installation to 20 per cent of subscribers annually.

▼ ▼

Damage Suit Filed for Telephone Disconnection

Edwin E. Mosier has filed an action in circuit court at Portland, Ore., seeking general damges of $25 and punitive damages of $50,000 from the Pacific Telephone & Telegraph Co., and George Anderson, agent of the company, alleging that on April 23 the defendants unlawfully removed the telephone from his home without his consent.

▼ ▼

Movie Anti-Trust Suits Against Bell Settled

The anti-trust suits, started in 1934, against American Telephone & Telegraph Co., Western Electric Co., and Electrical Research Products, Inc. (ERPI) have been settled, it was announced August 18. The plaintiffs were the Ninth Avenue Amusement Co., Henry D. Behr, Sound Pictures Engineers, Macy Mfg. Corp., Audio Equipment Maintenance, Inc., Service on Sound Corp., Standard Sound Service, S. Theodore Hodgman, Bernard R. Gogel, Thomas F. James, and John T. James.

The claims of the plaintiffs in these suits, broadly stated, were that from the beginning of the effort to introduce and establish commercial talking pictures, Western Electric Co. and ERPI, through alleged restrictive contracts with motion picture producers and exhibitors and owners of music copyrights, and in other ways, unlawfully interfered with the business of ERPI's competitors in the supplying and servicing of theatre equipment, and unlawfully restricted exhibitors in their selection of such equipments.

Claims similar to these were emphatically rejected early this year when Judge Nields, in the Federal District Court at Wilmington, Del., handed down his decision in suits instituted by General Talking Pictures Corp. and Duovac Radio Corp. against the same defendants.

In an exhaustive opinion the court

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found that the contractual provisions complained of were lawful and proper during the time when sound pictures were in the experimental and development stages, and that, after the sound picture art had become established commercially, these contractual provisions were either abandoned in practice or so applied that no unlawful restraints of trade resulted from them.

Plaintiffs in the suits mentioned have candidly recognized the force and effect of this decision. They have concluded that efforts to press their claims through trials, which of necessity would be protracted and costly, would not be warranted. The parties, therefore, reached settlements of the suits upon terms mutually acceptable.

▼ ▼

Asks Court to Uphold Oklahoma City Reduction

In an answering brief filed by J. B. A. Robertson, attorney for the Oklahoma Corporation Commission, the Oklahoma Supreme Court was asked August 9 to uphold a commission order for a reduction in Oklahoma City rates charged by the Southwestern Bell Telephone Co.

Replying to a brief filed by lawyers for the company, Attorney Robertson declared the hearing which closed last November revealed the company's excess earnings totaled $124,697 a year for the Oklahoma City exchange.

He said the commission's order for a reduction in rates will permit the company to earn more than 6 per cent annually on its $7,300,000 investment. The commission ordered a reduction of 50 cents a month on business telephones and 25 cents a month on private lines, for a total reduction estimated at $120,774 a year.

▼ ▼

Asks to Close Small, Unprofitable Exchange

Pleading that at the present time such exchange serves but 23 subscribers; that because of this the operation is unprofitable and that the cause of local conditions in and the character of the territory served, it will be unable to develop additional business for connections thereto, the Ohio Central Telephone Corp. recently petitioned the Ohio Public Utilities Commission for authority to abandon its exchange at Sparta, Ohio.

If such authority is granted the applicant states that it purposes to connect some of the present subscribers to the exchange at Cardington and to connect the others to the Centerburg exchange of the Mt. Vernon Telephone Corp. The hearing was assigned for September 1.

▼ ▼

Rate Increase Denied Wisconsin Telephone Co.

The Wisconsin Public Service Commission denied a temporary rate increase August 20, approximately $533,014 yearly, to the Wisconsin Telephone Co. which had sought the increase to cover emergency telephone taxes levied early this year. The commission dismissed the company's plea for a 4.4 per cent surcharge as unreasonable and discriminatory, and added that the company is now charging, in effect, rates which are 8 per cent excessive.

Application for the temporary rate increase was made March 4, following passage of emergency legislation which required the company to pay $686,516 in additional taxes to help finance social security aids. The company's request for a 4.4 per cent rate increase was based on an estimate that the increase would return $533,014 of the taxes to the company.

In its plea to the commission, the company complained that it had not earned a fair return upon its investment during the depression, and that recent increased business has been offset largely by increases in costs, including taxes and higher wages.

The commission replied in its order that the company's purported rates of return for 1936 and anticipated for 1937 were based on its own estimates of reproduction costs, accrued depreciation, depreciation expense, and other controversial items involved in the prolonged commission drive to reduce company rates, which is now tied up in the courts.

After examination of the company's operations, the commission found a material improvement in business and in the amount of net operating income, even after absorbing in the 1937 period one-third of the emergency tax.

From exchange service, to which the company proposed to pass the tax on to subscribers, the net operating income was greater for the 1937 period by $42,644 than for the 1936 period, but toll operations, where the company is content to absorb the payment of the tax, had a net operating income of $17,956 less.

The commission conceded it possessed the power to make temporary emergency increases, but flatly denied that the company is faced with an emergency. After noting that the company was prosperous enough to declare a 6 per cent dividend on its common stock at the end of 1936, the commission declared that the company is not faced with insolvency or impaired credit standing.

"The granting of substantial wage increases so late as June 7, 1937, does not indicate any alarm on the part of the management for the financial ability of the company," the commission pointed out.

▼ ▼

Final Nebraska Order On Uniform Accounting

A final order has been issued by the Nebraska State Railway Commission in connection with new requirements in the matter of uniform accounting systems for companies having annual revenues in excess of $50,000. The commission set aside all former orders, concurred in Resolution No. 126 requiring all companies operating two or more exchanges to report separately for each exchange.

This annuls previous orders requiring reports by groups of exchanges, and requires all reports to conform to the form of reports required by the federal authorities except as to depreciation. The commission holds that until federal action has been taken it has entire control of depreciation rates, and in this the courts have sustained it.

Under the new order, all Class A and B telephone companies not subject to the jurisdiction of the federal commission are relieved of reporting the basis of comparison with previous years; they are required to file the same annual reports as are filed with the

Federal Communications Commission; where operations cover other states also a supplemental annual report must be filed with segregated plant and operating and miscellaneous statistics for the state of Nebraska; annual reports by exchanges must be filed.

Monthly reports to the state commission are required from companies operating in Nebraska and such reports shall show balance sheet statement, operating revenues and expense and income statement. The order enters in detail as to the requirements made of the various classes of Nebraska companies.

▼ ▼

New Jersey Bell Loses Property Tax Suit

An assessment of $22,265,000 on personal property of the New Jersey Bell Telephone Co. in Newark was upheld August 3 by the New Jersey Supreme Court. The assessment had been reduced by the Essex County Tax Board to that figure from $24,000,000, the original Newark valuation. The company sought a reduction to $14,612,845.

The telephone company had appealed to the state board, but the board refused to reduce the county board's assessment. A writ of certiorari allowed by the court permitted a review of the state board's refusal. The August 3 decision, written by Justice Perskie, was a refusal by the state supreme court to interfere with the state board's ruling.

Both the company and the city agreed intangible personality had a taxing value of $1,393,485, but the company contested the city's right to levy on cash on hand totaling $1,626,024. Justice Perskie said the cash was taxable.

Tangible property, including the telephone plant, poles, wires and equipment, was valued at $19,245,491. The company asked that this be reduced to $13,219,000.

The company estimate was arrived at by a combination of three methods which included the fixing of a valuation and subtracting reductions, use of a table by which the state board fixes the method of assessing public utilities and figuring the assessment on the basis of capitalization and net earnings.

In refusing to accept the company method, the state board said the method was improper, since the costs used were spread over a period of years, and that 1924 values were no indication of 1934 values. The board also said the capitalized earnings method of arriving at an assessment was beyond the provisions of state law.

The board also said index figures which went to make up the book value were much higher in 1934 than when the property was installed, that the company did not take this into account, that there was no physical valuation made and that there was no estimate of reproduction cost.

The court held the company had failed to shoulder the burden of proof in its claims that the method of arriving at the tax was erroneous. "The company failed to prove," said Justice Perskie, "that the assessments were not made as required by law or that as made they failed to certify the true value of the prosecutor's taxable property."

▼ ▼

Asks Damages, Claiming Receiver "Exploded" in Ear

A petition naming the Star Telephone Co., Ashland, Ohio, as the defendant in a $15,000 damage suit has been filed in common pleas court in Ashland by Cassie Swigart of Mt. Vernon, who claims that she was injured by a defective telephone receiver August 3, 1935.

The plaintiff avers in her petition that while talking with the Gilbert Furniture Co., by means of an instrument owned by the defendant, the receiver "exploded" in her ear.

The petition also states that the mishap necessitated the medical attention which has failed to help the plaintiff in regaining her health, or the restoration of hearing.

The plaintiff also claims that the receiver was defective, and faultily constructed, and that it was subsequently repaired.

▼ ▼

Woman Is Fined $50 for Cutting Line

Telephone service, or rather lack of it, proved costly for Mrs. Sam Palmer, of Carrier, Okla. Talk over telephone lines is cheap, she learned, cheaper than cutting them, after paying $50 and costs, as ordered by Justice of the Peace J. W. Gettel on July 22.

Mrs. Palmer was haled into court to answer charges filed against her by the county attorney for maliciously severing a telephone line in front of her home. When the line was found cut, linemen of the Oklahoma Rural Telephone Co. repaired it. The afternoon of the same day they answered a second call to Mrs. Palmer's home where they found the line cut again.

When summoned to court, she failed to explain satisfactorily to the judge why she objected to the line running past her home, so the judge fined her $50 and costs.

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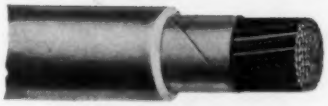

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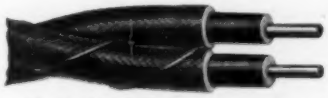

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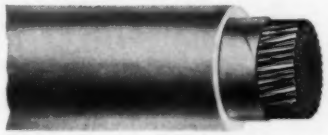

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"Telephony's" Engineering Data

By B. C. Burden

Index, General.
August 28, 1937.
No. 43-A, Page 74.

Theory and Practice of the Magneto Telephone Exchange—(Ctd.)

It will be seen that the pendulum type reed which carries the pole-changing contact is operated by two electromagnets connected in a typical doorbell type circuit. Operating current for these electromagnets is supplied by some form of primary battery capable of furnishing from one to two volts' operating potential.

When the armature is attracted to the electromagnet, the current contact is broken and the armature falls back; this cycle of events is repeated over and over. By tracing the circuit, it can be seen that the 90 volts furnished by the 60 dry cells is alternately connected to the output terminals, first in one direction and then in the opposite direction, thus, in effect, giving an alternating current.

These early pole-changers were open to the objection that they required a large number of dry cells (which were quite expensive and a bother to maintain) as well as a primary cell to operate the vibrating contact. They were generally equipped with some form of protective resistor or relay to limit the amount of current that would flow from the batteries into the line in the event that the line happened to be short-circuited.

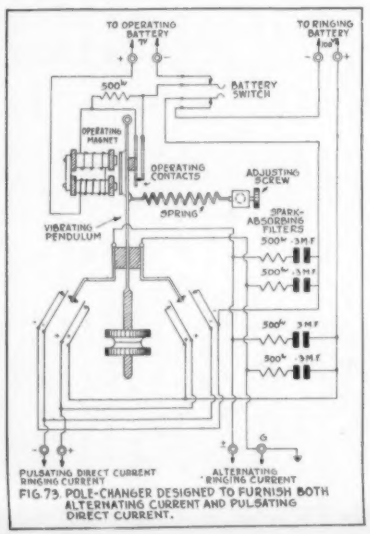

FIG. 73. POLE-CHANGER DESIGNED TO FURNISH BOTH ALTERNATING CURRENT AND PULSATING DIRECT CURRENT.

Fig. 73 illustrates a ringing machine of the pole-changer type which is equipped with extra contacts for producing pulsating direct current for ringing purposes as well as the

regular 20-cycle alternating current. Certain types of selective ringing systems which employ pulsating direct current will later be discussed.

In referring to this circuit (Fig. 73) it will be observed that the vibrator coils operate from a seven-volt battery

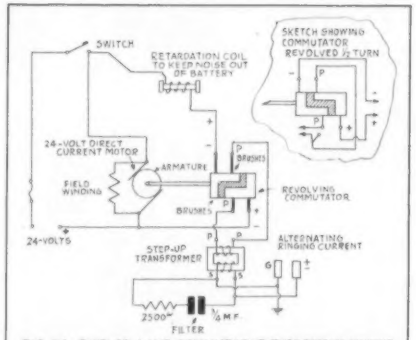

FIG. 74. BUTLER-LANE COMMUTATOR TYPE RINGING MACHINE.

while a 100-volt battery is required for the ringing current source. The 500-ohm resistors and 0.3 mf. condensers shunted across the contacts are for the purpose of absorbing and limiting the spark created, thus lengthening the life of the contact material.

The Commutator Type Ringing Machine

A popular type of ringing machine, at one time widely employed, consisted of a direct-current motor operating from the central office storage battery (or from direct current commercial power source). It was provided with a revolving commutator on one end, so arranged that battery current fed into this commutator would be reversed in the primary of a transformer; alternating current was thus produced in the secondary of this transformer.

Fig. 74 illustrates the circuit of this type of machine which was manufactured and known as the Butler-Lane ringing machine. Obviously, such a machine would not be useful in a magneto exchange in communities where direct current was not available for the operation of the motor.

This machine, when used on the central office battery (generally 24 volts) was able to develop 90 to 100 volts on the secondary winding, due to the step-up voltage ratio

of the transformer windings. These machines were characterized by their ability to give reliable service over long periods of time without the usual maintenance difficulties encountered with the older ringing machines employing vibrating contacts.

The Motor-Generator Ringing Machine

The motor-generator type ringing machine is one of the most satisfactory of all machines in use. It consists of an alternating current motor—generally a 110-volt, 60-cycle motor—driving a magneto type 20-cycle generator. The motor used has essentially constant speed characteristics; hence, the frequency and voltage of the magneto generator is very constant.

Of particular advantage is the fact that the generator is so designed as to furnish greater power than most other types of ringing machines. Hence this machine is capable of ringing satisfactorily on the heavily-loaded lines. These machines are more costly to operate and higher in first cost than other types of ringing machines. These factors, of course, make them less popular for the smaller exchanges. Fig. 75 illustrates the motor-generator type of machine.

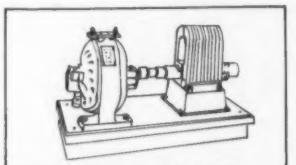
FIG. 75. MOTOR-MAGNETO TYPE RINGING MACHINE.

The Alternating Current Vibrating Reed Type Machine

A very common type of ringing machine is that which operates directly from the 110-volt, 60-cycle circuit by virtue of some type of tuned or vibrating reed circuit which first rectifies the alternating current and then pulses it to the proper frequency. The older machines of this type employed rectifying relays to change the alternating current into direct current and then to pulse the rectified current through a pole-changing pendulum arrangement.

The latest types of vibrating reed type alternating-current machines utilize copper oxide rectifiers for converting the 60-cycle line current into direct current, after which it is pulsed through a "pole-changing" reed to produce the desired ringing frequency.

Summary of Commission Rulings and Hearings

Federal Communications Commission, Washington, D. C

August 9: Telephone wire certificate filed with the telephone division by the Southern Bell Telephone & Telegraph Co. requesting authority to supplement existing facilities between Chipley and Panama City, Fla.

August 9: Telephone wire certificate filed with the telephone division by the Chesapeake & Potomac Telephone Co. of West Virginia requesting authority to supplement existing facilities between Shepardston and Martinsburg, in the state of West Virginia.

August 9: Telephone wire certificate filed with the telephone division by the Pacific Telephone & Telegraph Co. requesting authority to supplement existing facilities between Portland, Ore., and a point about one mile west of Wyeth, Ore.

August 10: Telephone division granted applications of the long lines department of the American Telephone & Telegraph Co. for licenses for use of specified frequencies at Lawrenceville, N. J., for fixed public point to point telephone service between Lawrenceville, N. J., and London, England and Paris, France, effective August 13. (Dockets, Nos. 4633 and 4634).

August 18: Petition of Garrett (Ind.) Telephone Co. for rehearing on order of the telephone division holding company subject to full jurisdiction of the commission, denied by full commission. The telephone division order held the Garrett company under its jurisdiction because the Indiana Bell company holds 50 per cent of its stock and 76 per cent of its bonds.

September 11: Hearing in Washington, D. C., before telephone division on application of the American Telephone & Telegraph Co., Lawrenceville, N. J., for authority to utilize the frequent 5085 for communication from its Lawrenceville, N. J., station to London and Paris.

October 6: Further hearing before the chief examiner to be held in the offices of the district attorney, post office and court house building, Cleveland, Ohio, to determine whether the Champaign Telephone Co., Urbana, Ohio, comes under the jurisdiction of the commission.

October 8: Further hearing before the chief examiner to be held at the offices of the Federal Communications Commission, new federal building, Detroit, Mich., to determine whether the Tri-County Telephone Co., South Haven, Mich., comes under the jurisdiction of the commission.

Georgia Public Service Commission

August 4: Order issued granting the Chickamauga Telephone Co. a rate increase following the company's improvement of its system.

The increases ranged from 25 cents a month for two and four-party residential lines to 50 cents a month for business telephones.

The company operates at Chicamauga and had 84 subscribers last December.

August 11: Hearing on the commission's rule nisi against the Southeastern Telephone Co. of Jacksonville, requiring an improvement of telephone service at Quitman.

Missouri Public Service Commission

August 18: Application filed by the Southeast Missouri Telephone Co. for authority to convert its telephone plant at Portageville to common battery and for authority to file new rates.

Nebraska State Railway Commission

August 19: Final order issued in the matter of uniform systems of accounting for companies having annual operating revenues exceeding $50,000.

August 19: Order entered continuing until September 15, at request of plaintiff, hearing of complaint filed by Central Nebraska Telephone Co. of Grant against Chase County Telephone Co., the purpose of which is compel operation to cease of line between Champion and Lamar.

August 21: Complaint filed by Nebraska Continental Telephone Corp. alleging that Howard County Rural Power District, which proposes to build 400 miles of rural transmission lines in Howard, Hall and Merrick counties, is planning construction in a manner detrimental to rural telephone service over considerable areas.

New York Public Service Commission

August 26-27: Hearing in Rochester before Commissioner Burritt in the proceeding on motion of the commission as to certain revisions to tariffs filed by Rochester Telephone Corp.

August 27: Hearing in Albany before Commissioner Lunn in the proceeding on motion of the commission as to certain revisions to the tariff by Chenango Valley Telephone Co.

Ohio Public Utilities Commission

August 16: Order issued directing 34 Independent telephone companies in the state to reduce from an unlimited period to two years the 25-cent monthly charge for handset telephones.

August 16: Order issued requiring 34 Independent telephone companies to remove the 25-cent monthly charge for handsets after a period of two years. Previously there was no limit to the length of time the extra charge could be made.

August 31: Hearing on the telegraphic complaint by the Northern Ohio Telephone Co., that the Wellington Telephone Co. was unlawfully invading the complainant's Oberlin exchange area, with leave to the defendent to answer on or before hearing.

September 28: Hearing scheduled in the state-wide Ohio Bell Telephone Co. rate case to consider the amount of refunds for the period 1925-1932.

Pennsylvania Utility Commission

August 7: Order issued approving creation of the Suburban Telephone Co., Butler, to acquire and operate properties of the Slippery Rock Independent, the Harrisville and the Portersville Telephone companies in Mutler, Lawrence, Beaver and Mercer counties.

Virginia Corporation Commission

August 7: Order issued authorizing the Chesapeake & Potomac Telephone Co. of Virginia to purchase and take over the operation about September 1 of the Bedford County Telephone & Telegraph Co.

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FIG. 79 POLE-CHANGER DESIGNED TO FURNISH BOTH ALTERNATING CURRENT AND PULSATING DIRECT CURRENT.

(generally 24 volts) was able to develop 90 to 100 volts on the secondary winding, due to the step-up voltage ratio

ringing purposes as well as the

pulsed through a "pole-changing" reed to produce the desired ringing frequency.

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T. M. Partridge Lumber Co., Minneapolis, Minn.—Northern White—Western Red Cedar Poles. Plain or butt-treated.

H. Sigalet & Company, Ltd., Lumby, B. C., Canada—Western Red Cedar Poles. Plain or butt-treated.

Valentine Clark Corporation, 2516 Doswell Ave., St. Paul, Minn.—Finished Cedar Poles. Plain or butt-treated.

Condensed Telephone News

Telephones

SAN FRANCISCO, CALIF.—The Pacific Telephone & Telegraph Co. and subsidiaries recently reported a net gain of 4,955 telephones in service in July, compared with a gain of 9,189 in July, 1936. The July gain brings the system's stations in service to a new high of approximately 1,721,260 telephones.

HARTFORD, CONN.—Southern New England Telephone Co. reports 333,672 telephone stations in service in Connecticut as of July 1, an increase of 2,531 for June and 13,908 for first six months of this year. The previous record for number of telephones in service established in May was eclipsed.

WASHINGTON, D. C.—The Chesapeake & Potomac Telephone Co. had a net gain of 1,378 stations during July, compared with a gain of 1,178 in July, 1936. For the first seven months of this year the gain was reported at 11,488.

MONROE, LA.—August 3 was a red letter day for the local exchange of the Southern Bell Telephone & Telegraph Co. as on that day there were in operation 6,440 telephones, which was the exact peak number in 1929 when the depression struck and caused hundreds of telephones to be removed from residences and public buildings.

The company is starting a $10,000 cable job on the north side where lines are being replaced by cable. This is being done to give improved present service and also to care for the anticipated heavier service required as the city expands toward the northeast.

PONTIAC, MICH. — Substantial increase in the first six months of 1937 in the number of telephones served by exchanges in the Pontiac area is reported by the Michigan Bell Telephone Co. The degree of increase varies from 3.85 to 57.20 per cent.

The gain for Pontiac proper was 1,644 telephones, an increase of 15.49 per cent. Inclusion of the Commerce exchange, of which the records are kept in the Pontiac office, boosts the figures to 1,779 new telephones, or an increase of 16.40 per cent.

Lake Orion and Clarkston led the smaller exchanges with percentage gains of 26.67 and 21.39 respectively.

As an index of activity, Pontiac's 15.49 per cent gain compares favorably with Detroit's 5.69 per cent, Bay City's 7.63 per cent, Flint's 7.59 per cent, Saginaw's 9.50 per cent, Battle Creek's 7.85 per cent, Grand Rapids' 7.08 per cent, Lansing's 7.16 per cent, and Monroe's 7.25 per cent.

DETROIT LAKES, MINN.—The number of telephones in Detroit Lakes totaled 1,200 on June 30 as compared with 1,100 a year ago, it was reported recently by Ted Fark, local manager of the Northwestern Bell Telephone Co., as his office rushed preparations for publication of the annual summer directory.

Telephones on farms and at cottages and resorts number 325 this year, an increase of about 25, Mr. Fark stated.

NEW YORK, N. Y.—The General Telephone Corp. has reported a net gain of 1,693 telephones installed during July, compared with a gain of 1,282 instruments in July, 1936. The gain for the first seven months of this year was 15,528 telephones, against 11,837 in the corresponding period of last year.

The company and its subsidiaries now have in operation 350,244 company-owned telephones.

CINCINNATI, OHIO—The Cincinnati & Suburban Bell Telephone Co. stations in operation as of July 31, totaled 173,624, a gain of 588 over June and 11,347 above the 162,277 stations operated in July, 1936.

COLUMBUS, OHIO—The Ohio Bell Telephone Co. gained 103 telephones during the month of July making the increase for the first seven months of the year 4498. The July gain brought the city's total number of telephones to 75,731. During July the company connected 1196 and disconnected 1093. During the first seven months 10,914 telephones were connected and 6416 were disconnected. In July of last year there was a net loss of 65 telephones.

PHILADELPHIA, PA.—The Bell Telephone Co. of Pennsylvania reported a net increase of 918 stations during the month of July, compared with a gain of 1,103 during July, 1936. Total increase for the first seven months of this year was 45,528.

In Philadelphia for the month of July there was a net loss of 864 Bell telephones. This compares with losses of 857 last year and 2,015 in 1935.

The company said 1,180,190 Bell telephones were in service in Pennsylvania July 31.

SEATTLE, WASH.—Along with an 8 per cent increase in long-distance telephone messages over July of 1936, a net gain of 685 telephone stations in the Washington-Idaho area during the month of July has been reported to I. F. Dix, vice-president and general manager of the Pacific Telephone & Telegraph Co. for the area.

The July gain brought the net gain for the seven months ended July 31 to 8,613 for the two states, as compared with a gain of 7,885 telephone stations for the same period last year, an increase of 728.

The July gain was less, however, than for July, 1936, when a gain of 1,353 was recorded. This was attributed chiefly to the large net increase in telephone installations over removals in Seattle in July, 1936, which was 739. It was the month of the Shrine convention when an unusual demand for telephone service was noted.

Seattle's net gain for July ,1937, was 154, as compared with the 739 for last July.

Construction

PORT ARTHUR, TEXAS—The Southwestern Bell Telephone Co. has announced an extensive program to cost $130,000 which will place new cables

and lines into rapidly growing subdivisions in the eastern part of the city. The extensions will have a potential capacity of serving 3,600 additional users, Roy M. Tomkins, manager, said. The work has begun and will be completed next May.

Elections

TYLER, TEXAS—Stockholders of the Gulf States Telephone Co. recently elected the following directors for the ensuing year: S. A. Lindsey, H. B. Marsh, Gus F. Taylor, P. T. Cole, Gerry Connally and Oscar Burton.

Officers chosen by the directors were: S. A. Lindsey, president and treasurer; H. B. Marsh, vice-president; Oscar Burton, vice-president and general manager; C. W. Jacobs, secretary and auditor; G. N. Ogletree, assistant treasurer, and Miss Anna Lee McMurray, assistant auditor.

Miscellaneous

LEHIGH, IOWA—The local office of the Central West Co. was sold recently to George A. Killie of Pine Bluff, Wyo. Mr. Killie has been employed by the Bell Telephone system in the northwest.

H. A. Ohlinger has been manager here for the past few years.

COLUMBUS, OHIO—Elmer E. Gillingham, telephone maintenance man for the Ohio Bell Telephone Co., at Columbus, retired recently after 20 years of continuous service with the company. Mr. Gillingham entered the employ of the company in May, 1917, after working for some 20 years as motorman on an electric street railway between Gallipolis and Point Pleasant, then as foreman of power houses at Pomeroy and at Wellston.

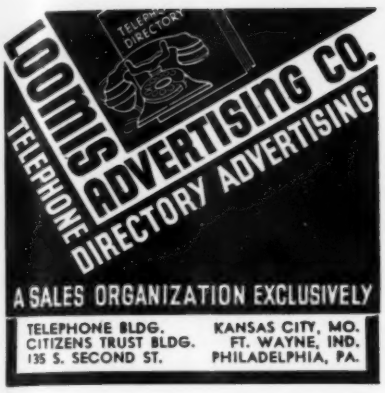
Obituary

DENVER, COLO.—David M. Livingston, state engineer for the Mountain States Telephone & Telegraph Co. at Boise, Idaho, and formerly of Denver, died August 1 in St. Joseph's hospital here, following a brief illness of a heart attack.

He was born in Kansas City and came to Denver as a boy. He had been in the service of the telephone company many years and had been connected with the Denver, Phoenix and Boise offices. He is survived by two sisters.

MT. VERNON, WASH.—Jess Rossell, local manager for the West Coast Telephone Co., died recently at the Rowley General Hospital in that city, as a result of an attack of bronchial pneumonia complicated by a heart ailment. Although born and raised in Kansas, Mr. Rossell spent most of his life in the western states.

Prior to becoming manager of the Mt. Vernon exchange of the Puget Sound Telephone Co. (predecessor to the West Coast company) he filled a number of offices in the city administration, including that of mayor of Mt. Vernon. He was 64 years old.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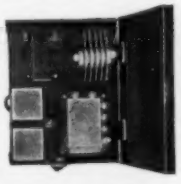

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Monarch No. 33 desk set with inside connection 3-bar 1000-1600 or 2500 ohm ringer signal set @ $7.85—4-bar @	10.00
Automatic Elec. Slip type Rec. with repolished shell and new cord, 95c; with new shell @	1.15
Kellogg No. 41 slip type Receivers with new shell and cord @	1.25
Leich Elec. Local Battery Transmitter complete with back and mouthpiece.	.90
Kellogg New Grabaphones, desk type, complete, less signal set, @	7.25
Western Elec. No. 20 Common Battery Ind. Coils @	.35
Chicago Telo. Supply 1000-1600 or 2500 ohm self contained ringers with gongs @	1.25
Western Elec. 60 Line No. 1200 floor type Swbd. equipped with 30 Shutter type drops and jacks, 5 double ringing single supervision cord Ckts. equipped with Transmitter Battery cut off, complete with Trans. Rec. hand Gen., etc.	150.00

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MAN, age 32—Eight years' service Bell System. Complete knowledge Commercial Department. Believe greater opportunity Independent companies. References, present supervisor. Address 8622, care of TELEPHONY.

IN THE NATION'S CAPITAL

(*Concluded from page 22*)

Roosevelt came into friendly and intimate contact with Commander Craven and was duly impressed with the latter's technical qualifications.

However, they are saying that Craven's appointment was a Presidential tap on the wrist for Commissioner Payne, who has been at odds with Craven over broadcasting policies. Rumors as to other repercussions at the FCC are flying too thick to keep track of. There is the rumor, for example, that Commissioner Sykes will be kicked upstairs through a Federal court appointment, and other gossip concerns a shake-up in lower commission officials.

It is almost a waste of time to listen to such tales. The really important matter that stands out above all else just now is that McNinch has been sent in to "hold that line" for the New Deal against the Montana triple threat man. If the latter ever gets loose, it will be just too bad for a certain quarterback.

▼ ▼

New Dial Equipment For Bellecenter, Ohio

Plans have been announced by the United Telephone Co. for expending $25,000 this year to install an automatic telephone system in Bellecenter in Logan county, Ohio. An automatic switch unit to cost $8,000 will replace the present switchboard which is to be installed in a new brick and tile building to be erected on Walnut street.

Linemen are now engaged in rebuilding the wire and pole facilities and it is estimated that 150 miles of new wire and 700 new poles will be used. When the new service is completed each subscriber will have a new dial telephone. No change in toll charges is planned at this time.

▼ ▼

Tear Gas Routes Pay Station Thieves

After thieves had taken three telephone pay stations from the wall of his filling station at 630 West Rich street, Columbus, C. D. Ward, a subscriber of the Ohio Bell Telephone Co., had a tear gas bomb placed behind the fourth pay station.

Soon thereafter when the thieves returned to get the fourth pay station, they were routed by the tear gas before they could complete their work. It was found that the telephone had been jerked loose from the wall but the money compartment had not been opened.